CITY OF THE DALLES, OREGON

CONTRACT NO. 2022-001

BIDDING REQUIREMENTS
AND
CONTRACT DOCUMENTS

for the construction of the

DOG RIVER PIPELINE REPLACEMENT

VOLUME 3: PERMITS AND APPROVALS

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JACOBS

Corvallis, Oregon

March 2022

Project No. D3504800 Copy No. ___________________

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VOLUME 3

1. **National Marine Fisheries Service (NMFS) Endangered Species Act (ESA) and Magnuson-Stevens Fishery Conservation and Management Act (MSA) Letter of Concurrence (#WCRO 2109 03698) (#WCRO-2019-03126).**

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OR 97232-1274

Refer to NMFS No:
WCRO-2019-03627

April 13, 2020

Mr. Richard Periman
Forest Supervisor
United States Department of Agriculture, Forest Service
Mt. Hood National Forest
16400 Champion Way
Sandy, OR 97055-7248

Re: Endangered Species Act Section 7(a)(2) Concurrence Letter for the Dog River Replacement Project

Dear Mr. Periman:

On December 16, 2019, NOAA's National Marine Fisheries Service (NMFS) received your request for a written concurrence that Mount Hood National Forest's (MHNF) permitting of the Dog River Pipeline Replacement Project under the Act of September 3, 1954 (68 Stat. 1146; 43 U.S.C. 931c, 931d) is not likely to adversely affect (NLAA) species listed as threatened or endangered or critical habitats designated under the Endangered Species Act (ESA). This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and an agency template for preparation of letters of concurrence.

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. In this case, NMFS concluded the action would not adversely affect EFH. Thus, consultation under the MSA is not required for this action.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). A complete record of this consultation is on file electronically at the Oregon Washington Area Office.

Consultation History

On August 26, 2016 NMFS attended a field trip to the Dog River diversion and pipeline and to the Crow Creek Reservoir with representatives of the MHNF, the Confederated Tribes of the Warm Springs, and the City of the Dalles.

On September 20, 2019 NMFS and MHNF met for a second field trip to Dog River pipeline route and the Dog River critical habitat above the East Fork Hood River confluence.

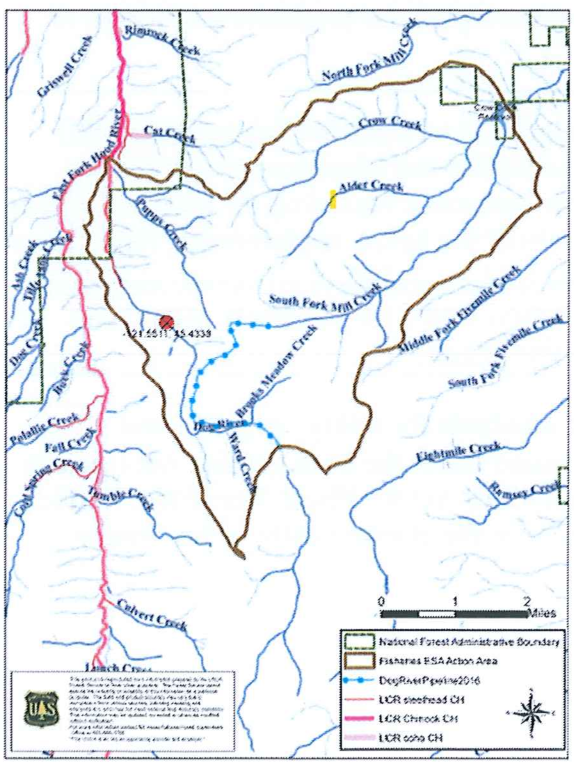
On November 12, 2019 MHNF provided NMFS with a draft Biological Assessment (BA) to review.

On December 16, 2019, MHNF requested informal consultation and provided NMFS with the final BA.

Proposed Action and Action Area

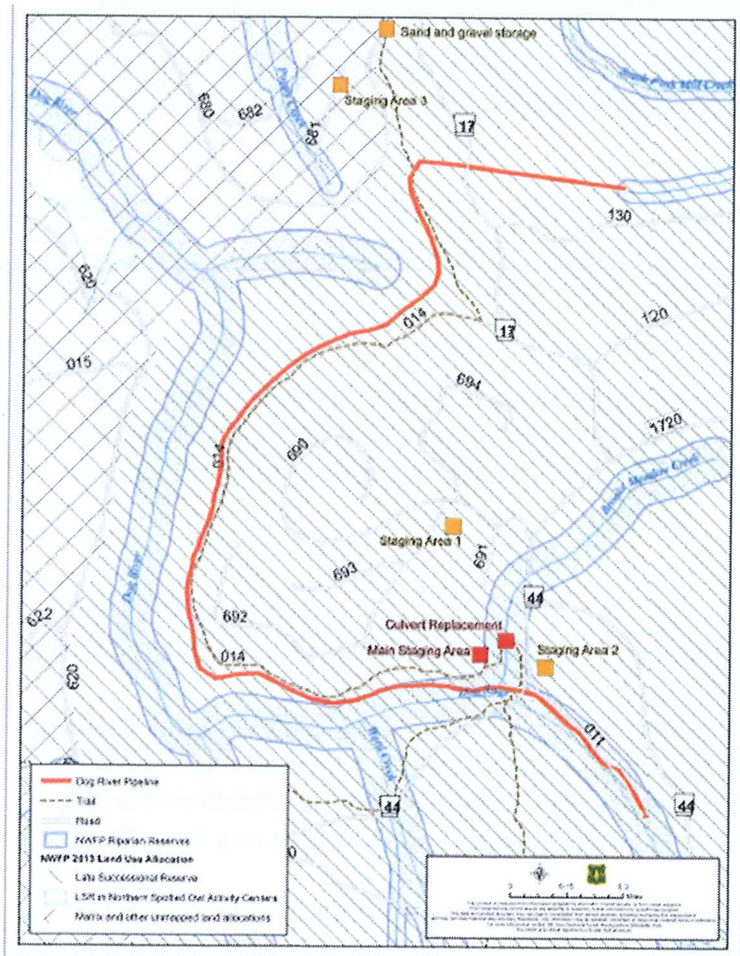
The MHNF proposes to issue to the City of the Dalles (City) a Special Use Permit to replace the existing Dog River diversion pipeline with a new pipeline. Dog River is a tributary to the East Fork of Hood River. The Dog River pipeline transfers water 3.4 miles from the Dog River diversion to a discharge structure on South Form Mill Creek on the opposite side of Surveyors Ridge. South Fork Mill Creek flows into the City's Crow Creek Reservoir. The pipeline route is shown as the blue dotted line in Figure 1 from the BA.

Figure 1: Dog River pipeline project layout



The City proposes to also replace the existing Dog River pipeline diversion structure, install fish screens to keep resident fish from entering the pipeline and replace the discharge structure on South Fork Mill Creek. The City will install a new culvert at the Brooks Meadow Creek 1700-014 road crossing. The City will establish staging areas for construction equipment, pipes, fill and other construction supplies (**Error! Not a valid bookmark self-reference.**).

Figure 2: Pipeline route, culvert replacement and staging areas.



To replace the Dog River pipeline, the City will remove 438 trees growing in the 3.4 mile long by 25 yard wide pipeline right of way. The City will use an excavator to dig a 3.4 mile trench alongside the existing pipeline for the new pipeline. The existing pipeline will be abandoned in place. The City will place the new pipeline into the trench and cover it with gravel, sand and fill. The material will be transported to the trench from staging areas by small rubber tired or tracked vehicles. During construction, an 8 inch diameter irrigation pipe will supply Dog Creek water to South Fork Mill Creek.

The new pipeline will be buried beneath Brooks Meadow Creek at a point about 0.1 miles above Dog River (

The City proposes to also replace the existing Dog River pipeline diversion structure, install fish screens to keep resident fish from entering the pipeline and replace the discharge structure on South Fork Mill Creek. The City will install a new culvert at the Brooks Meadow Creek 1700-014 road crossing. The City will establish staging areas for construction equipment, pipes, fill and other construction supplies (**Error! Not a valid bookmark self-reference.**).

Figure 2). Brooks Meadow Creek is 2.8 miles above the anadromous fish passage barrier but is habitat for resident fish. Road 1700-014 crosses Brooks Meadow Creek over an undersized culvert about 0.2 miles above the Dog River confluence and Brooks Meadow Creek often flows over the roadway, transporting sediment to Dog River. The City will replace the existing culvert with properly sized open box culvert and place three quarter inch aggregate on the 200 feet of the roadway at the crossing.

The City proposes to also replace the existing Dog River pipeline diversion structure, install fish screens to keep resident fish from entering the pipeline and replace the discharge structure on South Fork Mill Creek. The City will establish staging areas for construction equipment, pipes, fill and other construction supplies.

The pipeline diversion is 3.4 miles above the Dog River anadromous passage barrier. The existing diversion does not have a fish screen and will be replaced with an in channel screen structure that can be removed in the winter. The pipe inlet, flow measuring facilities, and discharge structure will also be replaced.

Project Design Criteria

1. Project Contact: Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.
2. List and describe any hazardous material that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.
3. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.
4. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.
5. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for emergency erosion and hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).
6. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.

7. No uncured concrete or form materials will be allowed to enter the active stream channel.
8. Steps to cease work under high flows, except for efforts to avoid or minimize resource damage.
9. Ensure pipeline is fabricated from materials meeting ODEQ standards for water quality.
10. Use suitable measures at the pipeline outlet to avoid or minimize erosion downstream of the structure when design flows are released.
11. Flagging Sensitive Areas – Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.
12. Staging Area – Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.
    a. No Topographical Restrictions – place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.
    b. Topographical Restrictions –place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.
13. Temporary Erosion Controls – Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.
14. Stockpile Materials – Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any large wood, topsoil, and native channel material displaced by construction will be stockpiled in a previously disturbed site as feasible for use during site restoration. Materials used for implementation of aquatic restoration categories (e.g., large wood, boulders, fencing material) may be staged within the 100-year floodplain.
15. Hazard Trees within riparian areas – Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse large wood objectives.
16. Choice of Equipment – Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).
17. Fueling and Cleaning and Inspection for Petroleum Products
    a. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes, etc.), and gas-powered equipment with tanks larger than five gallons.
    b. Store and fuel equipment in staging areas after daily use.
    c. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.
    d. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.

18. Temporary Access Points – Existing roadways will be used whenever possible. Minimize the number of temporary access points and travel paths to lessen soil disturbance and compaction and impacts to vegetation. When necessary, temporary access points will be decompacted and/or revegetated. Temporary points in wet or flooded areas will be restored by the end of the applicable in-water work period. Review PDC 7-4.
19. Streams, Riparian Areas and Wet Areas – Minimize disturbance in streams, riparian areas and wet areas. Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings will be abandoned and the stream channel and banks restored. Access, staging and stream crossing locations will be identified by hydro/fisheries prior to implementation
20. Work from Top of Stream Bank for Instream Work – To the extent feasible, heavy equipment will work from the top of the bank, unless work from another location (instream) would result in less habitat disturbance, less floodplain disturbance, less sediment in the stream channel, or less damage to the overall aquatic and riparian ecosystem.
21. Timely Completion – Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.
22. Initiate Rehabilitation – Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal from the National Forest of project related waste, spreading of non-vegetation stockpiled materials (soil, etc.) seeding, or planting with local native seed mixes or plants and restoration of stream channel bed and banks.
23. Short-term Stabilization – Measures may include the use of Forest Service approved materials, weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.
24. Decompact Soils – Excess materials should be stockpiled at an approved site, or dispersed and decompacted by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root. FS will review and approve the need to disperse or stockpile excess material.
25. Monitoring will be conducted by USFS staff, as appropriate for the project, during and after the project to track effects and compliance with this Dog River Pipeline Replacement Project EA.
    a. Implementation
        i. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated.
        ii. Fix any problems that arise during project implementation.
        iii. Regular biologist/hydrologist coordination if biologist/hydrologist is not always on site to ensure contractor is following all stipulations.

26. 401 Certification – To minimize short-term degradation to water quality during project implementation, follow current 401 Certification provisions of the Federal Clean Water Act for maintenance or water quality standards
27. Post Project – A post-project review shall be conducted after winter and spring high flows. Adaptively manage for substantial deficiencies identified during monitoring (i.e. adding large wood to the outlet channel or South Fork Mill Creek).
28. For each project, conduct a walk through/visual observation to determine if there are post-project affects that were not considered during planning. For fish passage and revegetation projects, monitor in the following manner:
    a. Fish Passage Projects – Note any problems with channel scour or bedload deposition, substrate, discontinuous flow
    b. Dog River Pipeline Outlet downstream to Crow Creek Reservoir (South Fork Mill Creek) – Monitor reach for any problems associated with additional flow (e.g. channel scour).
    c. Headcut Stabilization – Monitor headcut stabilization sites for effectiveness (e.g. scour or evidence of further headcutting).
29. Transportation/Engineering
    a. 4400 Road:
        i. After saw cutting pavement to replace new pipeline, rebuild sub-grade and sub-base in 6" lifts before replacing with a full depth asphalt patch.
    b. 4400011 Road:
        i. Clear road of obstacles and danger trees where needed to provide safe passage for planned vehicles.
        ii. If road is to be used in the wet season, surface road with 3"(-) aggregate or other surfacing material to minimize sediment flows.
        iii. Clean culverts and, or slope the road to drain, or install water bars to help drain surface and reduce sediment flows.
    c. 1700 Road:
        i. At new pipeline crossing rebuild sub-grade with 6" lifts, roll or compact and reestablish surface course.
        ii. Clean existing 18" CMP at pipeline crossing if needed.
        iii. Improve existing pipeline maintenance road (no FS road number) along pipeline that starts at this point and runs into Dalles Water Shed. (Plan for use in the future?)
    d. 1700690 Road:
        i. Blade road to drain and replace surface material when needed to reduce dust and sediment flows.
    e. 1700014 Road:
        i. Place, roll and compact 3/4"(-) aggregate material 100' each direction of road crossing at Brooks Meadow Creek to minimize the delivery of sediment erosion to the stream.
        ii. If road is to be used in the wet season surface portions of the road that have a native soil surface with 3"(-) aggregate or other surfacing material.
        iii. Clear road of obstacles and danger trees where needed to provide safe passage for planned vehicles.
        iv. Turnouts located approximately every 1000'.

v. Slope road to drain or install water bars to reduce sediment flows.

f. Staging areas:

i. Place 6” minimum compacted (8”-10” loose) aggregate base at Primary Pipe Storage areas. Turn around areas would be required to have compacted aggregate base.

30. Fuels

a. All activity created slash will be piled outside of riparian areas.

b. Pile size and location should be such to minimize damage to residual trees. Piles should be located at least 20-feet inside the unit boundary. Piles should not be placed on or in the following areas: pavement, road surface, ditch lines, or within 100-feet of a stream course.

31. Soils

a. All disturbed ground, including temporary storage and access points would use erosion control measures. A qualified specialist would monitor disturbed areas, as needed, to verify that erosion controls are implemented and functioning as designed and are suitably maintained.

32. In-water Work Period

a. Follow the appropriate state (ODFW 2008) or most recent guidelines for timing of in-water work (July 15-August 30). If in-water work needs to occur outside of this window, the USFS will request exceptions to the in-water work window with ODFW, as well as through the Level 1 NMFS representative.

33. Fish Passage Restoration Design

a. The culvert design and pipeline crossing at Brooks Meadow shall be reviewed by an interdisciplinary design team consisting of an experienced Engineer, Fisheries Biologist, and/or Hydrologist/Geomorphologist. If the culvert is wider than 20 feet or the cost exceeds $100,000, it shall be reviewed by the USDA-Forest Service, Region 6, Aquatic Organism Passage Design Assistance Team.

b. All road-stream crossing structures shall simulate stream channel conditions per Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road- Stream Crossings (USDA-Forest Service 2008a), located at: http://stream.fs.fed.us/fishxing/aop_pdfs.html. Within the considerations of stream simulation, the structure shall, at a minimum, accommodate a bankfull wide channel plus constructed banks to provide for passage of all life stages of native fish species (for more information, reference Chapter 6, page 35 of the USFS Stream Simulation Guide). The following crossing-width guidance applies to specific ranges of entrenchment ratios as defined by Rosgen (1996): a. Non-entrenched Streams: If a stream is not fully entrenched (entrenchment ratio of greater than 1.4), the minimum culvert width shall be at least 1.3 times the bankfull channel width. This is consistent with Anadromous Salmonid Passage Facility Design (section 7.4.2 “Stream Simulation Design”). (NMFS 2011e) However, if the appropriate structure width is determined to be less than 1.3 times the bankfull channel width.

c. Entrenched Streams: If a stream is entrenched (entrenchment ratio of less than 1.4), the culvert width must be greater than bankfull channel width, allow sufficient vertical clearance to allow ease of construction and maintenance activities, and provide adequate room for the construction of natural channel banks. Consideration should be given to accommodate the flood-prone width. Flood-prone width is the width measured at twice the maximum bankfull depth (Rosgen 1996).

d. Bankfull width shall be based on the upper end of the distribution of bankfull width measurements as measured in the reference reach to account for channel variability and dynamics.

e. Headcut and Grade Stabilization – Headcuts often occur in meadow areas, typically on Rosgen "C" and "E" channel types. Headcuts develop and migrate during bankfull and larger floods, when the sinuous path of Rosgen E type streams may become unstable in erosive, alluvial sediments, causing avulsions, meander cut-offs, bank failure, and development of an entrenched Rosgen G gully channel (Rosgen 1994). These stabilization BMPs would apply during project - activities in the vicinity of the stream crossing replacement location and at the pipeline stream crossing location.

   i. Armor headcut with sufficiently sized and amounts of material to prevent continued up-stream migration of the headcut. Materials can include both rock and organic materials which are native to the area. Material shall not contain gabion baskets, sheet pile, concrete, articulated concrete block, and cable anchors.

   ii. Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.

   iii. Minimize lateral migration of channel around headcut ("flanking") by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of channel.

   iv. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage must be incorporated into the final headcut stabilization action and be completed during the first subsequent in- water work period.

34. Work Area Isolation, Surface Water Withdrawals, and Fish Capture and Release

a. Isolate capture area – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets and or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation in the trap.

b. Capture and release – Fish trapped within the isolated work area will be captured and released as prudent to minimize the risk of injury, then released at a safe release site, preferably upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided—large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of the construction. Capture and release will be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.

c. Electrofishing – Use electrofishing only where other means of fish capture may not be feasible or effective. If electrofishing will be used to capture fish for salvage, NMFS's electrofishing guidelines will be followed (NMFS 2000).Reasonable effort should be made to avoid handling fish in warm water temperatures, such as conducting fish evacuation first thing in the morning, when the water temperature would likely be coolest. No electrofishing should occur when water temperatures are above 18°C or are expected to rise above this temperature prior to concluding the fish capture.

d. Dewater Construction Site –When dewatering is necessary, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow downstream with a by-pass pipe large enough to handle the diverted flow. Small amounts of instream material can be moved to help seal and secure diversion structures. If pumps are used to dewater, the intake must have a fish screen(s) and be operated in accordance with ODFW fish screen criteria. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

e. Stream Re-watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

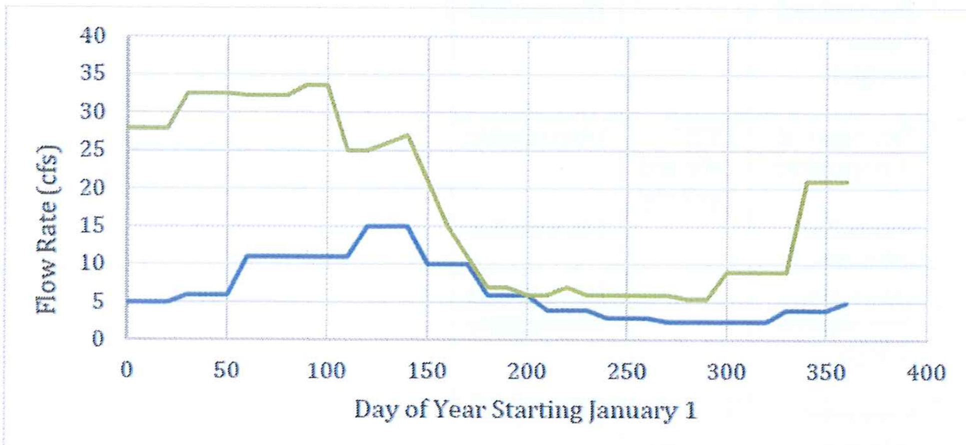
We considered whether or not the proposed action would cause any other activities and determined that it would cause the following changes: 1) The new, larger diameter pipeline would enable the City, at times, to increase the rate at which it diverts water from Dog River. The existing pipeline has a capacity of 12.7 cubic feet per second. The new pipeline will have a capacity of 26.3 cubic feet per second. The flow rate of Dog River at the diversion ranges from 3 cubic feet per second in September to 16 cubic feet per second in May so the increased capacity is only useful for about one month of the year (Figure *3*) during spring high flows; 2) The new pipeline will eliminate up to 1.5 cubic feet per second of water leaks in the existing pipeline. Leaked water percolates to groundwater where its added mass increases the pressure gradient between the groundwater elevation and the elevation of surface water in Dog River. This pressure gradient drives groundwater into Dog River. The amount of resulting flow in Dog River is also a function of the (unknown) permeability of the groundwater medium. The City proposes to leave at least, 0.5 cubic feet per second of water in the Dog River channel below the diversion during the months of August and September. We do not know but suspect that this is similar to the Dog River flow resulting from leakage in the existing pipeline during the late summer when it is about 25 percent full.

The action area includes the Dog River and South Fork Mill Creek[1] watersheds from the pipeline diversion to the confluence with the East Fork Hood River and the Crow Creek Reservoir respectively (Figure 1). The lower two miles of Dog River is critical habitat for LCR Chinook salmon, LCR coho salmon and LCR steelhead. The Hood River population of LCR spring Chinook salmon is extirpated. Dog River critical habitat is occupied by LCR coho salmon and LCR steelhead.

Background and Action Agency's Effects Determination

Dog River flow is primarily supplied by snowmelt during the spring and early summer and by springs and groundwater from the late summer through the winter. The pipeline diversion is at Dog River mile 6.0. The average Dog River flow rate ranges from 3 to16 cubic feet per second at the diversion. Average flow ranges from 6 to 34 cubic feet per second at the East Fork Lewis River confluence (Figure 3). The main perennial tributaries to Dog River below the diversion are Brooks Meadow Creek and Puppy Creek. The channel is steep below the diversion with a 60 foot waterfall at river mile 2.6 that is a passage barrier to anadromy. The watershed is largely forested.

Figure 3: Average Dog River discharge at the pipeline diversion and EFHR confluence



The City has water rights to all of the flow in Dog River at the diversion. Currently, diverted Dog River water combines with South Form Mill Creek water to fill the Crow Creek reservoir from October to February while City demand for water is relatively low. The capacity of the reservoir is 35.7 million cubic feet. Once the reservoir is full, the Dog River diversion rate is maintained at about 3 cubic feet per second until May when the diversion is increased to about 8 cubic feet per second during high spring runoff. The City takes all of the water at the diversion from July to October. The City is investigating increasing the volume of the Crow Creek reservoir to 85.6 million cubic feet. The Crow Creek reservoir is on the MHNF so increasing its capacity would require another Special Use Permit Section 7 consultation. The City is also investigating

[1] Mill Creek below the reservoir is critical habitat for the Fifteenmile Creek population of Middle Columbia River steelhead. However, the proposed action has no effect on Mill Creek below the reservoir.

pumping treated water into the aquafer beneath the City during the winter and spring and pumping that water back to the surface in the summer when demand is high.

The MHNF broke the proposed action into five parts; abandonment of the existing pipeline and construction of the new pipeline, construction of the Brooks Creek culvert, reconstruction of the Dog River diversion structure, construction and use of staging areas and pipeline operations. The MHNF conclusions on the effects of stressors from each part of the proposed action are summarized in Table 1.

Table 1: MHNF effects determinations for the proposed action.

Activity	PBF	Stressor	Species	MHNF Conclusion
Pipeline construction	Water quality	Tree removal (Temperature)	LCR coho and steelhead	Discountable
		Suspended sediment		Discountable
		Chemicals		Discountable
	Natural cover	Tree removal (LWD)		Discountable
	Water quantity (Peak/base flows)	Tree removal (Snow storage)		Discountable
Culvert replacement	Water quality	Tree removal (Temperature)	LCR coho and steelhead	Discountable
		Suspended sediment		Discountable
		Chemicals		Discountable
	Natural cover	Tree removal (LWD)		Discountable
Diversion construction	Water quality	Suspended sediment	LCR coho and steelhead	Discountable
		Chemicals		Discountable
Staging Area	Water quality	Tree removal (Temperature)	LCR coho and steelhead	Discountable
		Suspended sediment		Discountable
		Chemicals		Discountable
Pipeline Operations	Water Quantity	Instream flow	LCR coho and steelhead	Discountable

The MHNF determined that the effects of the proposed action on CR coho and LCR steelhead and their critical habitat are as follows:

1. Removal of 438 trees from the pipeline right of way and project staging areas may decrease Dog River shade, reduce the supply of future Dog River LWD, alter the timing and increase the magnitude of Dog River peak flows, contribute to the disturbance history of the watershed and reduce the width of riparian reserves. As a result, listed coho and steelhead in 0.5 miles of Listed Fish Habitat (LFH) may be exposed to higher water temperature, reduced channel complexity, and peak flows that scour redds.

2. Construction of the new pipeline, a new culvert on Brooks Meadow Creek and the new diversion and fish screens may cause sediment to be exposed and eroded into Dog River. As a result, listed coho and steelhead and redds may be exposed to suspended sediment.

3. Mechanical equipment used to construct the new pipeline, Brooks Creek culvert, diversion structure and staging area could leak fuel and hazardous fluids into Dog River exposing coho and steelhead to chemical contamination.

4. Increasing the pipe diameter could cause the City to increase the flow diverted from Dog River. As a result, listed coho and steelhead may be exposed to decreased water quantity and decreased peak flows.

The MHNF concluded that the above effects are not likely to adversely affect LCR steelhead or LCR coho as follows:

1) The MHNF reasoned that the removal of trees in the pipeline right of way will have a discountable impact on Dog River summer stream temperature. Trees that are removed are eitheron the north side of Dog River, supplying little shade in the summer or over 100 feet from Dog River such that they don't contribute significant shade or canopy cover to Dog River. Lost shade from removed trees is offset by cold water tributaries and groundwater springs that supply cold water to Dog River in the summer. The MHNF reasoned that removal of right of way trees will have a discountable effect on LWD recruitment to LFH because none of the removed trees are next to the channel, most trees are over 100 feet from the channel and all of the removed trees are more than 2.7 miles above the natural passage barrier at River Mile 2. The MHNF reasoned that removed trees will have a discountable effect on the timing and magnitude of peak flows, disturbance history or riparian reserves because their canopy area is a very small fraction of the Dog River watershed canopy.

2) The MHNF reasoned that construction of the new pipeline trench, Brooks Meadow Creek culvert and new diversion structure will supply an discountable amount of sediment to Dog River because PDCs will stop erosion from these construction projects until the disturbed areas are restored.

3) The MHNF reasoned that the effects of potential for fuel and hazardous fluid spills from construction equipment is discountable because PDCs will likely detect defective equipment before spills occur or rapidly contain and clean up any spills that do occur.

4) The MHNF reasoned that the effect of the larger pipe diameter on Dog River instream flow is discountable because the City will divert the same amount of flow with the new pipe that it diverts with the existing pipe.

ENDANGERED SPECIES ACT

Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b). When evaluating whether the proposed action is not likely to adversely affect listed species or critical habitat, NMFS considers whether the effects are expected to be completely beneficial, insignificant, or discountable. Completely beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

We concur with MHNF that the removal of 438 trees from the pipeline right of way is unlikely to cause increased summer water temperature, decreased LWD or increased peak flows in coho and steelhead habitat in lower Dog River.

The likelihood that Dog River will be exposed to higher solar radiation because of the reduced shade is discountable. The trees closest to the channel are on the north side of the stream and don't shade the stream (Figure *2*). The trees to be removed that are within 100 feet of the stream are 2.7 miles upstream from the lower reach of Dog River occupied by coho and steelhead and six cold water tributaries and cold groundwater springs feed Dog River between these trees and LFH. The rest of the trees are greater than one site potential tree height from the stream.

The likelihood that coho and steelhead rearing juveniles will be exposed to increase in summer water temperature in Dog River is discountable because the increase in temperature is expected to be discountable. Water temperature monitoring reported in the BA shows that the water temperature in Dog River in the summer remains below 13 degrees Celsius in July and August.

The likelihood that future Dog River critical habitat will have reduced in stream LWD as a result of the removed trees is discountable. The trees to be removed are too far from the stream to be recruited into the channel when they fall over.

The likelihood of coho and steelhead exposure to reduced LWD from proposed tree removal is discountable. The trees are too far from the channel to become LWD.

The likelihood that Dog River will have higher peak flows as a result of proposed tree removal is discountable. The canopy area of the removed trees is too small a fraction of watershed canopy area to change the amount of snow stored in the canopy (Grant et al., 2008) such that rain on snow events increase peak flows.

The likelihood that coho and steelhead eggs in redds or rearing juveniles will be exposed to higher peak flows resulting from the removal of 438 trees in the watershed is discountable because the likelihood of higher peak flows is discountable.

We concur with MHNF that the risk of water quality degraded by increased suspended sediment in Dog River from the construction of the new pipeline, Brooks Meadow Creek culvert, Dog River diversion and staging areas is discountable because PDCs minimize the potential for erosion of exposed sediment and the riparian zone will capture sediment before it is transported to the Dog Rive channel.

The likelihood that coho and steelhead redds, rearing juveniles or returning adults are likely to be exposed to suspended sediment is discountable because the likelihood that sediment exposed by construction actions will be transported to the channel is discountable.

We concur with the MHNF that chemicals from equipment fuel and hazardous fluid spills are unlikely to degrade Dog River water quality or substrate quality. The likelihood that Dog River water or channel substrate will be exposed to and degraded by chemicals from mechanical equipment fuel or fluids spills is discountable because PDCs require that equipment be inspected and maintained to minimize spills and that spills are contained and cleaned up before they reach the Dog River channel.

The likelihood that coho or steelhead eggs and embryos, rearing juveniles or returning adults will be exposed to chemicals from construction equipment fuel or fluid spills is discountable because PDCs minimize the risk that fuel or fluids will be spilled or reach the Dog River channel before they are cleaned up.

We concur with MHNF that the larger diameter pipe is unlikely to affect Dog River water quantity and instream flow. The likelihood that the City will divert additional water in the warm summer months such that the water quantity in Dog River decreases is discountable. During low summer low flows, the quantity of water diverted is unrelated to the pipeline diameter and the City diverts virtually all of the flow at the diversion from July through October. Under the proposed action, the City will leave 0.5 cubic feet per second of water in the channel at the diversion.

The likelihood that rearing coho and steelhead rearing juveniles will be exposed to reduced summer Dog River instream flow is discountable because there is no additional water to divert in the summer.

Conclusion

Based on this analysis, NMFS concurs with MHNF that the proposed action is not likely to adversely affect the subject listed species and designated critical habitats.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the MHNF or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) the proposed action causes take; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the written concurrence; or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes the ESA portion of this consultation.

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. The MHNF also has the same responsibilities, and informal consultation offers action agencies an opportunity to address their conservation responsibilities under section 7(a)(1).

Sincerely,

Scott Hecht

Scott Hecht, Ph.D.
Branch Chief,
Washington Coast-Lower Columbia
NOAA Fisheries, West Coast Region

cc: Richard Periman, USDA-USFS-Mt Hood
Chuti Fielder, USDA-USFS-Mt Hood

REFERENCES:

Grant, G.E., Lewis, S.L., Swanson, F.J., Cissel, J.H., and McDonnell, J.J. (2008). Effects of forest Practices on Peak Flows and Consequent channel response: A State of Science Report for Western Oregon and Washington (Portland, OR.: United States Department of Agriculture Forest Service Pacific Northwest Research Station), pp. 76.

2. U.S. Department of Agriculture (USDA) - U.S. Forest Service (USFS) National Environmental Policy Act (NEPA) Record of Decision.

United States
Department of
Agriculture

Forest
Service

Mt. Hood National Forest

Barlow Ranger District

June 2020

Dog River Pipeline Replacement

Environmental Assessment

USDA Forest Service
Barlow Ranger District
Mt. Hood National Forest
Hood River County, Oregon
T.1S., R.10E., S.34
T.2S.,R.10E., S2,3,4,9,10,11; Willamette Meridian

Vic Anderson and Paul Weigelt
at Dog River Pipeline Head Gate (8/19/1923)

for the greatest good

Lead Agency:	U.S. Forest Service
Responsible Official:	Richard Periman, Forest Supervisor Mt. Hood National Forest
Information Contact:	Kameron Sam District Ranger (541) 461-5101 kcsam@fs.fed.us
Project Website:	https://www.fs.usda.gov/project/?project=34721

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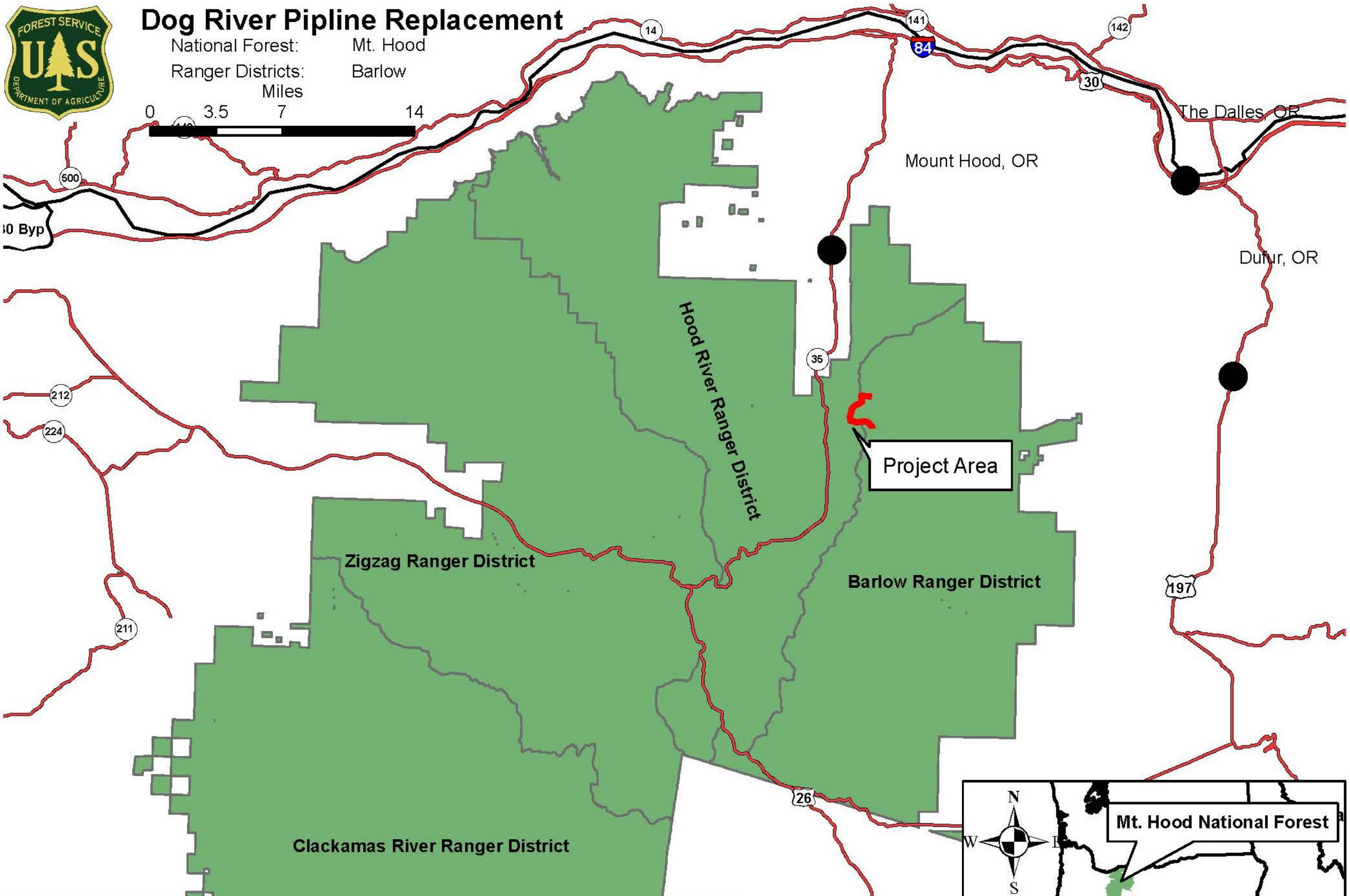

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Chapter 1 – Introduction

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations.

1.1 Document Structure

This Environmental Assessment discloses the direct, indirect, and cumulative environmental effects that would result from the No Action (baseline) and Proposed Action alternatives. The document is organized into four parts:

- Introduction: The section includes information on the background of the project and the purpose and need for action. This section also includes how the Forest Service informed the public and other interested parties of the proposal.
- Alternatives, including the Proposed Action: This section provides a description of the No Action and Proposed Action alternatives, project design criteria, and mitigation measures that were added as a result of environmental analysis.
- Environmental Consequences: This section describes the environmental effects of the No Action alternative as well as the trade-offs and effects of implementing the Proposed Action alternative. This analysis is organized by resource area. Within each section, the existing environment is described first, followed by the estimated effects of the alternatives.
- Consultation and Coordination: This section provides information on agencies consulted during the development of the Environmental Assessment.

Additional documentation, including more detailed analyses of planning area resources, may be found on the project's website (https://www.fs.usda.gov/project/?project=34721) and in the project record at the Barlow Ranger District office in Dufur, Oregon.

1.2 Background

The existing Dog River pipeline, which is an important component of The City of the Dalles' public drinking water supply, was constructed in the early 20th century. It consists of milled pieces of fir that were assembled in a circular shape and wrapped with heavy-gauge galvanized wire and coated with tar. Over the past 100 years, this pipe has deteriorated, is leaking, and is no longer conveying water efficiently. Because the pipe is in poor condition, the City of The Dalles has requested the pipeline be replaced with a 24-inch-diameter pipe.

The existing pipeline follows topographic contours along a circuitous route around Dog River Mountain to maintain gravity flow. Specifically, the pipeline travels north along the Dog River gauging station access road 4,000 linear feet to Forest Service Road (FSR) 44. It traverses to the west and then to the north along the base of Dog River Mountain, approximately 13,700 linear feet. The pipeline then travels 2,000 linear feet through a small hill by way of a 40-foot-deep hand-excavated notch. The pipeline crosses FSR 1700 and parallels the existing access road south of the Mill Creek gauging station, where it discharges into South Fork Mill Creek.

The legal description for the project area is: Township 1 South, Range 10 East, Section 34; and, Township 2 South, Range 10 East, Sections 2, 3, 4, 9, 10, 11; Willamette Meridian.

1.3 Purpose and Need for Action

The purpose of this project is to replace the existing Dog River pipeline. There is a need for action because the pipeline has become so deteriorated that it no longer provides the most efficient way of conveying water to the City of The Dalles municipal water supply to continue to fulfill the commitment under an existing Memorandum of Understanding (MOU).

1.4 Management Direction

This Environmental Assessment has been completed in accordance with direction contained in the National Forest Management Act, the National Environmental Policy Act, the Council on Environmental Quality regulations, Clean Water Act, the Endangered Species Act and all other applicable laws, policies and regulations. This Environmental Assessment is tiered to the Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 1990). In addition, management direction for the area is provided in the following Forest Plan amendments:

- The Northwest Forest Plan (NWFP) – Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994);
- Survey and Manage – Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA Forest Service et al. 2001); and,
- Invasive Plants – Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision (USDA Forest Service 2005); and Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia Gorge Scenic Area in Oregon (USDA Forest Service 2008).

Mt. Hood National Forest Land and Resource Management Plan

There are three land use allocations (LUAs) as designated by the Forest Plan within the planning area: Scenic Viewshed (B2), Special Emphasis Watershed (B6), and Timber Emphasis (C1) (Figure 2).

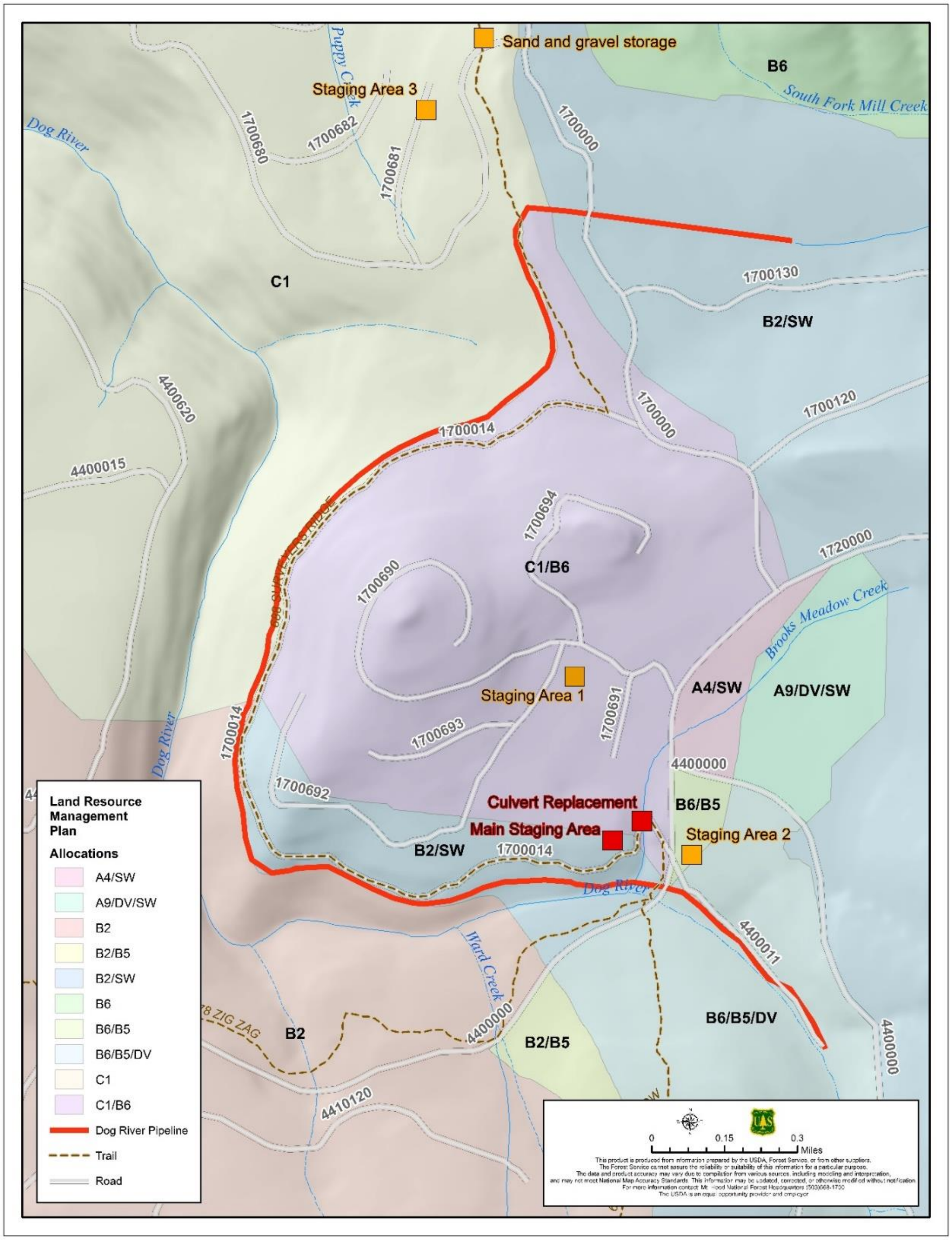
B2-Scenic Viewshed (Forest Plan, pages 4-218 through 4-220): The goal for this LUA is to provide attractive, visually appealing forest scenery with a wide variety of natural appearing landscape features. The major characteristics are for the visual character of the landscape resulting from prescribed visual quality objectives within distance zones from selected viewer positions. For this project, Dufur Mill Road serves as the main viewer position.

B6-Special Emphasis Watershed (Upper Dog River) (Forest Plan, pages 4-246 through 4-252): The Upper Dog River Special Emphasis Watershed was designated for the City of The Dalles Municipal Watershed. The goal of this area is maintain or improve watershed, riparian, and aquatic habitat conditions and water quality for municipal uses and/or long-term fish production. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices.

C1-Timber Emphasis (Forest Plan, pages 4-289 through 4-290): This LUA includes approximately half of the planning area and the main pipe storage areas. The goal for this land is to provide lumber, wood fiber, and other forest products on a fully regulated basis, based on the capability and suitability of the land. A secondary goal is to enhance other resource uses and values that are compatible with timber production.

Chapter 3 (Environmental Consequences) evaluates the Proposed Action's consistency with the Forest Plan Standards and Guidelines associated with these LUAs.

Figure 2. Forest Plan Land Use Allocations within Dog River Pipeline Replacement Planning Area



Northwest Forest Plan

There are three Northwest Forest Plan land use allocations included within the planning area, which are: Riparian Reserves, Late-Successional Reserves (LSR), and Matrix (Figure 3).

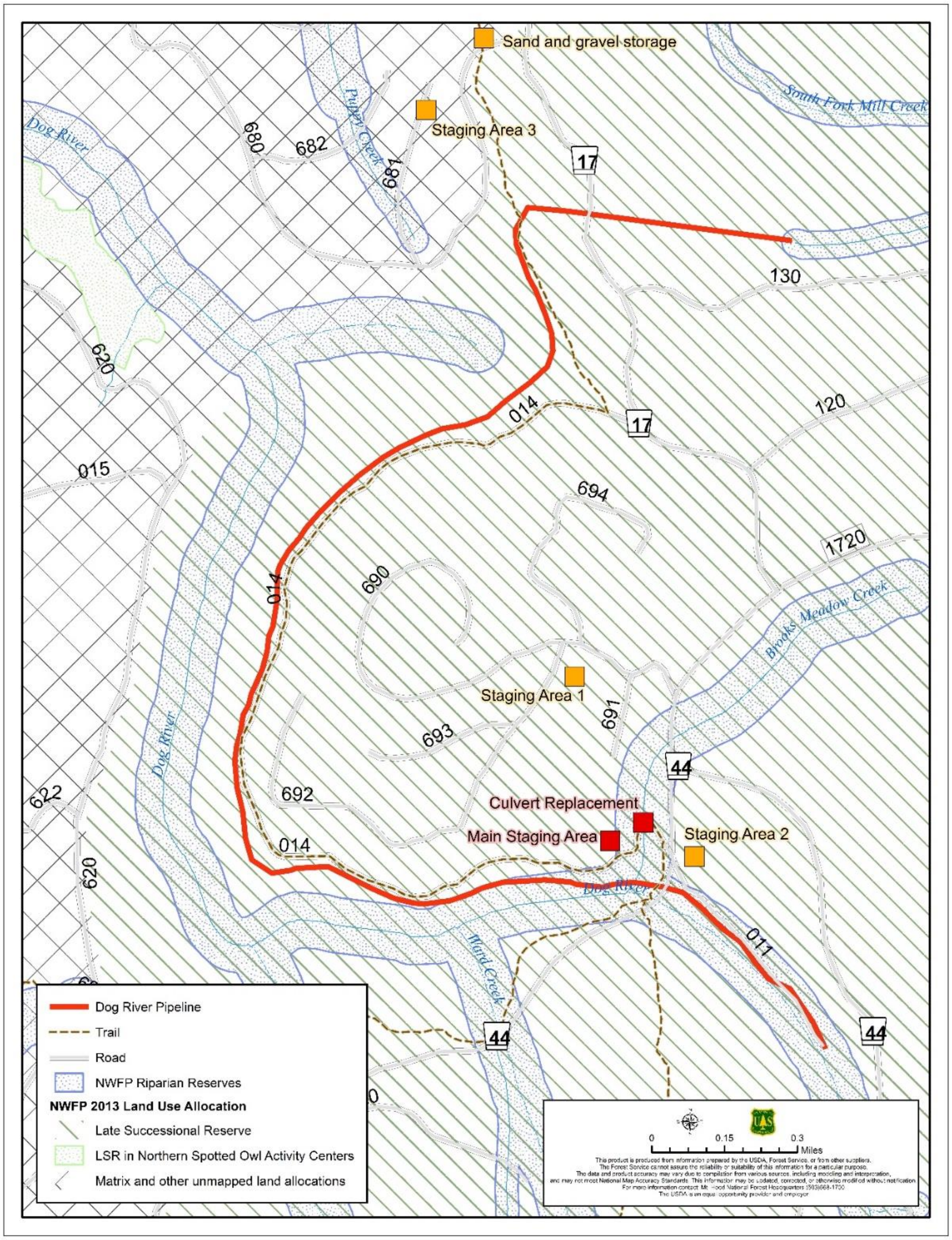
Riparian Reserves include areas along rivers, streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis.

Late-Successional Reserves, in combination with other allocations and standards and guidelines, are to maintain a functional, interactive, late-successional forest ecosystem. The Surveyors Ridge LSR Assessment for this area includes The Dalles Municipal Watershed Pipeline Replacement Project as a detailed project proposal (USDA Forest Service 1997, p. 86).

Matrix areas consists of lands outside of designated areas (i.e., Congressionally Reserved Areas, LSRs, Adaptive Management Areas, Administratively Withdrawn Areas, and Riparian Reserves).

Chapter 3 (Environmental Consequences) evaluates the Proposed Action’s consistency with the Northwest Forest Plan Standards and Guidelines associated with these land use allocations, including consistency with Aquatic Conservation Strategy (ACS) objectives.

Figure 3. Northwest Forest Plan Land Allocations within the Dog River Pipeline Replacement Area



1912 Cooperative Agreement & 1972 Memorandum of Understanding

Because much of the municipal water supply originates from National Forest System lands, a cooperative agreement was signed between the United States Department of Agriculture and the City of The Dalles in 1912 for the purpose of conserving and protecting it within a specified area that includes both Federal and non-federal ownership. The intent of the 1912 Agreement was formalized again in 1972 as per Forest Service Manual 2542 with a Memorandum of Understanding (MOU) between the City of The Dalles and the Mt. Hood National Forest to maintain and protect the quality and quantity of water originating from National Forest System lands for municipal use. It included management direction and a ten-year management plan for both Federal and City-owned lands.

The intent of the 1972 MOU was carried forth into the Forest Plan according to Forest Service direction (Forest Service Manual 2542, 2007), and National Forest System lands were designated further as a Special Emphasis Watershed, with specific management standards and guidelines.

1.5 Public Involvement

A scoping letter was shared with the public in 2012. One commenter responded. A second scoping letter was sent to the public in March 2016. Dog River was listed in the Mt. Hood National Forest quarterly planning newsletter (Schedule of Proposed Action [SOPA]) as an ongoing project in spring 2016. Five commenters responded during the second public scoping period. Scoping comments and responses are included in the project record.

In August 2016, a field trip to the project area included Forest Service staff and representatives from the NOAA National Marine Fisheries Service (NMFS), City of The Dalles, and the Confederated Tribes of Warm Springs. The intent of this field trip was to discuss issues and understand the City's operation of the pipeline and diversion.

A Preliminary Environmental Assessment was published on November 10, 2018 and a 30-day comment period concluded on December 10, 2018. Five commenters responded. Comments and responses are included in Appendix A. After the comment period ended, Forest Service staff met with the Confederated Tribes of Warm Springs (February 2019) and a representative from the City of the Dalles (March 2019). The purpose of these meetings was to discuss project concerns and next steps in anticipation of developing this Environmental Assessment.

1.6 Issues

Issues serve to highlight effects or unintended consequences that may occur from the Proposed Action, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the Responsible Official and public to understand. Issues are best identified during scoping early in the process to help set the scope of the actions, alternatives, and effects to consider; but, due to the iterative nature of the NEPA process, additional issues may come to light at any time. Issues are statements of cause and effect, linking environmental effects to actions, including the Proposed Action (Forest Service Handbook 1909.15, 12.4). Issues are used to generate additional action alternatives to the Proposed Action.

Several concerns and recommendations raised during the scoping and comment periods were addressed as either modifications to the Proposed Action, changes to the project design criteria, or as reason to conduct additional research and analysis. The following highlights some of the common concerns raised by comments on the Preliminary Environmental Assessment, but all comments were considered and are responded to in Appendix A. While concerns were considered throughout the NEPA process, none were identified as issues for the purpose of formulating fully developed alternatives.

Since most of the comments received on the Preliminary Environmental Assessment pertained to hydrology and fisheries, the entirety of the Final Hydrology Report and Final Fisheries and Aquatic Fauna Biological Evaluation are included in this Environmental Assessment. In addition, the Biological Assessment submitted to National Marine Fisheries Service (NMFS) for this project can be found on the project website: https://www.fs.usda.gov/project/?project=34721.

Water Rights

Some comments expressed concern about water rights. Therefore, additional research and analysis was conducted to address water rights more fully, which is included in the hydrology section (Section 3.3) of this document.

City Plans for Future Water Use

Some comments expressed concern about the City's plans for future water use, within the context of current use and water rights. The hydrology section (Section 3.3) of this document provides more background, data, and analysis of the City's future plans.

Current Pipeline and Seepage

Some comments expressed concern about quantifying the amount of water lost to seepage under current conditions, and how that could be considered to inform the effects analysis of the Proposed Action. More information was added to Section 3.3 of this document to better address the expected effects of pipeline replacement, and the enhanced efficiency of water conveyance.

Fish and Fish Habitat

Some comments expressed concern about how the Proposed Action might affect threatened, endangered, and sensitive fish and other aquatic species, as well as native resident fish and other aquatic populations. The fisheries and aquatic fauna section (Section 3.4) of this document addresses projected effects to aquatic resources.

1.7 Differences between the Preliminary Environmental Assessment and the Environmental Assessment

The Proposed Action has been updated to show that the City of the Dalles will include 0.5 cubic feet per second (cfs) bypass flow below the point of diversion during August, September, and October, instead of only September and October as described in the Preliminary EA. Additional data were considered and further analyses were conducted for the hydrology and fisheries reports. Additional data included stream flow records from the City of The Dalles, USGS, USFS, and OWRD for Dog River, the South Fork of Mill Creek, and the Crow Creek reservoir. The Mt. Hood National Forest also collected data over the spring through summer of 2019. Effects were addressed more comprehensively, and refinements were made to Sections 3.3 and 3.4 of this Environmental Assessment to better describe effects. Also, consultation with the National Marine Fisheries Service (NMFS) was completed, which included all new and supplemental data. Lastly, project design criteria were refined to better protect cultural and natural resources.

Chapter 2 – Alternatives

This chapter is intended to describe the alternatives and how they were formulated for this project. This chapter provides readers and the Responsible Official with a description of the Proposed Action components, project design criteria/mitigation measures, monitoring requirements, and regulatory framework. Two alternatives were considered: the No Action Alternative and the Proposed Action Alternative. No other alternatives were considered for this project.

2.1 No Action Alternative

Under the No Action Alternative, current management plans would continue to guide management of the area. The existing pipeline would remain in place and would continue to degrade and leak. Additionally, the current diversion would remain in place, and no fish screens or diversion structures would be installed. This diversion would continue to serve as a barrier to aquatic and semi-aquatic fish passage.

In the long term, the pipeline would continue to degrade and would likely lose additional water as growing vegetation would continue to compromise the integrity of the wooden pipeline. At some point, the pipeline may suffer a catastrophic failure and no longer provide the City of The Dalles with this portion of their municipal water supply.

The No Action Alternative would not repair any crossings, and the unimproved ford crossing at Brooks Meadow Creek would remain in place. The current use pattern and crossing would not change, and the unimproved crossing would continue to serve as a potential barrier to aquatic and semi-aquatic organisms. Administrative use on this road system would not change. No action would mean that current minimal road maintenance would occur, and no road reconstruction would occur.

2.2 Proposed Action Alternative

The Proposed Action is the replacement of the existing pipeline with a new pipeline, allowing the City of The Dalles to utilize more efficiently the water being diverted from Dog River. The existing 3.4 mile antiquated pipeline would be abandoned in place. A seam-sealed 24-inch-diameter pipe would be constructed parallel and next to the existing alignment as much as possible. The existing pipeline would continue to be used to convey water to South Fork Mill Creek until the new pipeline is constructed.

In addition to pipeline replacement, the project would repair and improve the diversion structure and install fish screens and a fish passage structure. A new culvert would also be constructed under the service road (Forest Service Road (FSR) 1700-014) that crosses Brooks Meadow Creek to provide passage for aquatic organisms. Summer low flows in lower Dog River would be improved by adding 0.5 cubic feet per second (cfs) bypass flow below the point of diversion during August, September, and October. Implementation of the Proposed Action would include best management practices (BMPs) and project design criteria (PDCs), which are discussed in the following section, to minimize effects to natural and cultural resources.

Existing trees and dead wood would be cut and removed within a 25-foot corridor. Approximately 438 live trees ranging in size from six to 48 inches DBH would be removed. Of these 438 trees, approximately twelve trees are larger than 24 inches DBH, 170 trees are between 12 and 14 inches DBH, and the remaining trees are 11 inches DBH and smaller. In addition to the live trees, approximately 198 standing dead trees would be cut. Of these, over half are between 11 and 20 inches DBH, roughly three dead trees are over 30 inches DBH, 22 dead trees are between 20 to 30 inches DBH, and the remainder of the dead standing trees are under 11 inches DBH.

A trench for the pipeline would be excavated and would be approximately 4-feet deep by 3 to 4-feet wide. Spoils would be stockpiled to either side of the trench to be used to re-bury and cover the trench after the pipe has been laid in the ground. Gravel and/or sand would be brought to the trench and staged within reach for use as bedding and backfill. The pipe would be placed on top of the bedding emplaced in the bottom of the trench. Then the trench and pipe would be backfilled and overlaid with more gravel and/or sand before being buried and covered using the removed spoils. The pipe inlet, discharge structure, and flow measuring facilities would also be replaced. The construction corridor would be accessed along the existing service road (FSR 1700-014) and would avoid operating over the old pipeline. Where the pipeline intersects Brooks Meadow Creek, it would be buried under the stream and the channel over it would be restored.

FSR 1700-014 would be used as the main access for the length of the pipeline. This road is currently a rough, native and gravel surface, single-lane road that crosses Brooks Meadow Creek at an unimproved ford. The project would first install a cement prefabricated open box culvert that would provide passage for aquatic organisms prior to pipeline construction, eliminating the need for a ford crossing. During the construction, the stream would be re-routed around the work area as the culvert is being installed using a temporary bypass line. During construction activities, FSR 1700-014 would be temporarily closed to the public.

There are several staging areas and a main staging area identified for use during the construction period (Figure 2). The main one-acre staging area would be located along the FSR 1700-014 west of the crossing at Brooks Meadow Creek, and would accommodate the transport of pipe to the construction corridor. It would also act as a temporary storage area for the trees and logs removed from the corridor. Minor realignment of FSR 1700-014 between Brooks Meadow Creek and the main staging area would be completed to allow for construction vehicle traffic. There are several other locations identified for storing pipe, gravel, and sand: 1) on either side of FSR 1700-691 where it intersects with FSR 1700-690; 2) along FSR 4400-011 at the junction with FSR 4400; or, 3) at an old landing off of FSR 1700. Gravel and sand may also be stored at the junction of FSRs 1700 and 700-680 roads (Figure 2). All of the staging areas would be rehabilitated upon completion of the project.

The new pipeline would continue to be maintained and operated as it conventionally has for many decades, conveying water diverted from upper Dog River to South Fork Mill Creek for municipal use by the City of The Dalles in accordance with existing state and federal authorizations. Pipeline operations would remain unchanged. In most years, the headworks at the pipeline inlet would be operated to increase diverted flow in the late fall and early winter to re-fill Crow Creek reservoir, typically by early or mid-February. Once full, the amount of diversion would be reduced to a maintenance flow that would supplement South Fork Mill Creek and contribute to storage in order to meet variations in seasonal demand.

2.3 Project Design Criteria and Mitigation Measures

The National Environmental Policy Act defines “mitigation” as avoiding, minimizing, rectifying, reducing, eliminating or compensating project impacts. The following project design criteria (PDC), best management practices (BMPs), and mitigation measures are an integral part of this project and would be carried out if the Proposed Action is implemented. BMPs are specified in *The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide* (April 2012). The effects analysis in Chapter 3 is based on these PDC, BMPs, and mitigation measures being implemented.

2.3.1 Aquatic Conservation Measures

2.3.1.1. Technical Skill and Planning Requirements

A. Any project element that will be designed or implemented by the City of The Dalles or their designee (contractor) must be reviewed by qualified Forest Service staff (e.g., fisheries biologist, hydrologist, engineer, silviculturist, fire/fuels specialist). A Forest Service fisheries biologist or hydrologist will be involved in the planning and design review of all instream elements of the project. For all contracted work, planning and design includes field evaluations and site-specific surveys, which may include reference-reach evaluations that describe the appropriate geomorphic context in which to implement the project.

B. A Forest Service Permit Administrator or their designee would monitor the implementation of the PDCs during construction and operations on a regular basis and will have the authority to provide direction and/or take action if construction or operations are not conducted according to the project design criteria.

2.3.1.2 In-water Work Period

A. Follow the appropriate state (ODFW 2008) or most recent guidelines for timing of in-water work (July 15-August 30). If in-water work needs to occur outside of this window, the Forest Service will request exceptions to the in-water work window with the Oregon Department of Fish and Wildlife, as well as through the Level 1 NMFS representative

2.3.1.3 Water Quantity

A. Maintain 0.5 cfs of bypass flow of water in-stream at the point of diversion between August 1 and October 31.

B. The City of The Dalles will monitor continuous streamflow in Dog River, both above and below their diversion structure. Instrumentation will be installed, operated, and maintained by the City. The streamflow data will also be collected, stored, and maintained by the City, and provided to the Forest Service upon request, such as at regular agreed-to dates.

2.3.1.4 Fish Passage

A. Fish passage will be provided for any adult or juvenile fish likely to be present in the action area during construction. Temporary stream isolation and dewatering at Brooks Meadow Creek will be necessary and will follow fish capture and release described below. After construction, adult and juvenile passage that meets ODFW's fish passage criteria will be provided for the life of the project.

2.3.1.5 Pollution and Erosion Control Measures

A. Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.

B. List and describe any hazardous materials that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.

C. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.

D. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.

E. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for emergency erosion and hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).

F. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.

G. No uncured concrete or form materials will be allowed to enter the active stream channel.

H. Steps will be taken to cease work under high flows, except for efforts to avoid or minimize resource damage.

I. Ensure pipeline is fabricated from materials meeting ODEQ standards for water quality.

J. Use suitable measures at the pipeline outlet to avoid or minimize erosion downstream of the structure when design flows are released.

2.3.1.6 Site Preparation

A. Flagging Sensitive Areas – Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.

B. Staging Area – Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.

C. No Topographical Restrictions – Place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.

D. Topographical Restrictions – Place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.

E. Temporary Erosion Controls – Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.

F. Stockpile Materials – Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any large wood, topsoil, and native channel material displaced by construction will be stockpiled in a previously disturbed site as feasible for use during site restoration. Materials used for implementation of aquatic restoration categories (e.g., large wood, boulders, fencing material) may be staged within the 100-year floodplain.

G. Hazard Trees within Riparian Areas – Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse large wood objectives.

2.3.1.7 Heavy Equipment Use

A. Choice of Equipment – Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).

B. Fueling and Cleaning and Inspection for Petroleum Products

1. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes, etc.), and gas-powered equipment with tanks larger than five gallons.
2. Store and fuel equipment in staging areas after daily use.
3. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.
4. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.

C. Temporary Access Points – Existing roadways will be used whenever possible. Minimize the number of temporary access points and travel paths to lessen soil disturbance and compaction and impacts to vegetation. When necessary, temporary access points will be decompacted and/or revegetated. Temporary points in wet or flooded areas will be restored by the end of the applicable in-water work period.

D. Streams, Riparian Areas and Wet Areas – Minimize disturbance in streams, riparian areas and wet areas. Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings will be abandoned and the stream channel and banks restored. Access, staging and stream crossing locations will be identified by a hydrologist or fisheries biologist prior to implementation

E. Work from Top of Stream Bank for Instream Work – To the extent feasible, heavy equipment will work from the top of the bank, unless work from another location (instream) would result in less habitat disturbance, less floodplain disturbance, less sediment in the stream channel, or less damage to the overall aquatic and riparian ecosystem.

F. Timely Completion – Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.

2.3.1.8 Site Restoration

A. Initiate Rehabilitation – Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal from the National Forest of project-related waste, spreading of non-vegetation stockpiled materials (soil, etc.) seeding, or planting with local native seed mixes or plants and restoration of stream channel bed and banks.

B. Short-term Stabilization – Measures may include the use of Forest Service approved materials, weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.

C. Decompact Soils – Excess materials should be stockpiled at an approved site, or dispersed and decompacted by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root. The Forest Service will review and approve the need to disperse or stockpile excess material.

D. Pipeline Stream Crossing – Restore stream channel to pre-construction conditions.

2.3.1.9 Monitoring

Monitoring will be conducted by Forest Service staff, during and after the project to track effects and compliance to ensure it is consistent with this Environmental Assessment.

A. Implementation

  1. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated.
  2. Fix any problems that arise during project implementation.
  3. Regular coordination with the fisheries biologist or hydrologist if fisheries biologist or hydrologist is not always on site to ensure contractor is following all stipulations.

B. Post Project – A post-project review shall be conducted after winter and spring high flows. Adaptively manage for substantial deficiencies identified during monitoring (e.g., adding large wood to the outlet channel of South Fork Mill Creek).

  1. For each element of the project, conduct a walk through and visual observation to determine if there are post-project affects that were not considered during planning. For fish passage and revegetation activities, monitor in the following manner:
  2. Fish Passage Activities – Note any problems with channel scour or bedload deposition, substrate, and discontinuous flow.
  3. Dog River Pipeline Outlet downstream to Crow Creek Reservoir (South Fork Mill Creek) – Monitor for any problems associated with additional flow (e.g., channel scour).
  4. Headcut Stabilization – Monitor headcut stabilization sites for effectiveness (e.g., scour or evidence of further headcutting).

2.3.1.10 Installation of Aquatic Organism Passage (AOP) and Pipeline Crossing at Brooks Meadow Creek

A. The culvert design and pipeline crossing at Brooks Meadow Creek shall be reviewed by an interdisciplinary design team consisting of an experienced engineer, fisheries biologist, and/or hydrologist/geomorphologist. If the culvert is wider than 20 feet or the cost exceeds $100,000, it shall be reviewed by the USDA-Forest Service, Region 6, Aquatic Organism Passage Design Assistance Team.

B. All road-stream crossing structures shall simulate stream channel conditions per Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USDA-Forest Service 2008a), located at: http://stream.fs.fed.us/fishxing/aop_pdfs.html. Within the considerations of stream simulation, the structure shall, at a minimum, accommodate a bankfull wide channel plus constructed banks to provide for passage of all life stages of native fish species (for more information, reference Chapter 6, page 35 of the USFS Stream Simulation Guide).

C. Headcut and Grade Stabilization – Headcuts often occur in meadow areas, typically on Rosgen "C" and "E" channel types. Headcuts develop and migrate during bankfull and larger floods, when the sinuous path of Rosgen E type streams may become unstable in erosive, alluvial sediments, causing avulsions, meander cut-offs, bank failure, and development of an entrenched Rosgen G gully channel (Rosgen 1994). These stabilization BMPs would apply during activities in the vicinity of the stream crossing replacement location and at the pipeline stream crossing location.

   1. Armor headcut with sufficiently sized and amounts of material to prevent continued up-stream migration of the headcut. Materials can include both rock and organic materials which are native to the area. Material shall not contain gabion baskets, sheet pile, concrete, articulated concrete block, and cable anchors.
   2. Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.
   3. Minimize lateral migration of channel around headcut ("flanking") by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of the channel.
   4. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage must be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period.

D. Isolate the construction area and remove fish from the project site.

   1. Isolate Capture Area – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and minimize fish predation in the trap.
   2. Capture and Release – Capture and release of resident trout will be conducted by Mt Hood National Forest and ODFW fish biologist.
   3. Electrofishing –Electrofishing will be conducted by Mt. Hood National Forest and ODFW fish biologists.

E. Dewater Construction Site – When dewatering is necessary, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow downstream with a by-pass pipe large enough to handle the diverted flow. Small amounts of instream material can be moved to help seal and secure diversion structures. If pumps are used to dewater, the intake must have a fish screen(s) and be operated in accordance with ODFW fish screen criteria. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

F. Stream Re-watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

2.3.1.11 Head-gate Diversion Replacement/Relocation & Screen Installation/ Replacement

A. ODFW Fish Passage Review and Approve – The Forest Service will ensure that the action is individually reviewed and approved by ODFW for consistency with fish passage criteria. This applies across the action area.

B. Diversion structures associated with points of diversion and future fish screens must pass all life stages of aquatic species that historically used the affected aquatic habitat.

C. Water diversion intake and return points must be designed (to the greatest degree possible) to prevent all native fish life stages from swimming or being entrained into the diversion. Abandoned ditches and other similar structures will be plugged or backfilled, as appropriate, to prevent fish from swimming or being entrained into them.

D. When making improvements to pressurized diversions, install a totalizing flow meter capable of measuring rate and duty of water use. For non-pressurized systems, install a staff gage or other measuring device capable of measuring instantaneous rate of water flow.

E. Do not flush or otherwise move sediment from behind diversion structure downstream. Deposit and stabilize sediment removed from behind diversion structure in a suitable designated upland site.

2.3.2 Transportation/Engineering

2.3.2.1. Forest Service Road 4400:

A. After saw cutting pavement to replace new pipeline, rebuild sub-grade and sub-base in 6-inch lifts to match existing asphalt.

2.3.2.2 Forest Service Road 4400-011:

A. Clear road of obstacles and danger trees where needed to provide safe passage for planned vehicles.

B. Maintain the culverts, ditchlines, and roadbed to reduce sediment delivery into waterbodies. install water bars to help drain surface and reduce sediment flows.
C. If road is to be used during wet conditions, surface road with 3-inch minus aggregate or other road surfacing material to reduce sediment delivery into waterbodies.

2.3.2.3 Forest Service Road 1700:

A. At new pipeline crossing rebuild sub-grade with 6-inch lifts, roll or compact and reestablish surface course.
B. Clean existing 18-inch culvert at the pipeline crossing if needed.
C. At existing pipeline maintenance access route, FSR 4400-011, which starts at FSR 1700 and runs adjacent to the pipeline, maintain ditchlines and roadbed to reduce sediment delivery into waterbodies and install rolling dips to help drain surface water.

2.3.2.4 Forest Service Road 1700-690:

A. Blade road to drain and replace surface material when needed to reduce dust and sediment flows.

2.3.2.5 Forest Service Road 1700-014:

A. Place, roll and compact ¾-inch minus aggregate material 100 feet in each direction of road crossing at Brooks Meadow Creek to minimize the delivery of sediment erosion to the stream.
B. If the road is to be used in the wet season, surface portions of the road that have a native soil surface with 3-inch minus aggregate or other road surfacing material.
C. Clear road of obstacles and danger trees where needed to provide safe passage for planned vehicles.
D. Turnouts should be located approximately every 1000 feet.
E. Slope road to drain or install water bars to reduce sediment flows.

2.3.2.6 Staging Areas:

A. Place 6 inches minimum compacted (8”-10” loose) aggregate base at primary pipe storage areas. Turn around areas would be required to have compacted aggregate base.

2.3.2.7 Miscellaneous:

A. If the access routes are to be used in the winter by wheeled vehicles, a snow plow permit would be required by the Forest Service and approved and signed by the District Ranger. The City of the Dalles/Director of Public Works will notify the Forest Service of any winter operations proposed.
B. A Forest Service road use permit may be required for maintenance and repair of damaged Forest System Roads used for this project.
C. A Forest Service engineer will review final plans of all project activities prior to implementation.

2.3.3 Wildlife

A. If a northern spotted owl nest is found, there would be timing restrictions between March 1 and July 15 for all activities within 65 yards of the owl nest patch.

B. Leave 5% of the largest felled trees (live or dead) on the site with even distribution and species selected for habitat considerations. Trees should be limbed and the slash piled.

C. If a wolf den or rendezvous site is found in or near the project area, no activities associated with the proposed action will be allowed within one mile of the den or rendezvous site from April 1 through July 15.

2.3.4 Fuels

A. All activity-created slash will be piled outside of riparian areas.

B. Slash piles should have a sound base to prevent toppling over and should be wider than they are tall. Pile branches with their butt-ends toward the outside of the pile, and overlap them so as to form a series of dense layers piled upon each other. Use a mixture of sizes and fuels throughout the pile. There should be no long extensions protruding from the piles. Do not construct piles on stumps or on sections of large down logs.

C. Any mechanical slash piling would be done with equipment capable of picking up (grasping) slash material and piling (as opposed to pushing/dozing). Piles need to be 8-feet wide at base, 6-feet high as a minimum. An allowance for a small deviation from the stated dimensions would be made as long as this deviation does not jeopardize meeting any other stated goals. Any piling of slash will be kept separate from the chip material.

D. Hand piles would be constructed with enough fine fuels to allow for ignition during fall and winter months, and covered, to facilitate consumption of piled fuels. Piles need to be 8-feet wide at base, 6-feet high as a minimum. An allowance for a small deviation from the stated dimensions would be made as long as this deviation does not jeopardize meeting any other stated goals.

E. Piles should be as compact and free of dirt as possible.

F. Pile size and location should be such to minimize damage to residual trees. Piles should be located at least within the construction corridor. Piles should not be placed on or in the following areas: pavement, road surface, ditch lines, or within 100-feet of a stream course.

G. Piles would be burned within two years of contract termination.

H. All boles remaining on site would be limbed and material would be piled.

2.3.5 Recreation

A. The Surveyors Ridge Trail would be closed for as little time as possible understanding that closure due to safety concerns and the need for new construction is necessary. Pipeline replacement construction timing across the Surveyors Ridge Trail would be coordinated with Forest Service recreation staff to reduce impacts during times of high usage.

B. The City of The Dalles would work with Forest Service recreation staff to develop public information materials and outreach plan using a combination of key entry/exit portals, visitor information boards and outreach via websites and other information sources.

C. The public would be notified of trail closures, detours, or alternative routes as early as possible utilizing signs at trail heads as well as media outlets such as newspapers and websites. Trail closures would be posted no later than two weeks before the closure would occur.

2.3.6 Visuals

A. In order to keep the pipeline corridor visually subordinate along FSR 44, as many trees as possible would be retained along the FSR 44 corridor to maintain a visual buffer between the road and the pipeline corridor.

B. Piles would be visually subordinate along the pipeline corridor adjacent to FSR 44. They would be burned within two years of contract termination.

C. Tree stumps would be maintained at heights of 6 inches or less within the foreground (up to ½ mile) and be angled away from the roadway to meet retention standards adjacent to FSR 44.

D. Tree paint and boundary flagging would not be marked facing the roadway along FSR 44.

2.3.7 Soils

A. All disturbed ground, including temporary storage and access points would use erosion control measures. A qualified specialist would monitor disturbed areas, as needed, to verify that erosion controls are implemented and functioning as designed and are suitably maintained. Due to the rating of Moderate Compaction Hazard, a minimum of 60% effective groundcover is required before the first overwintering period.

2.3.8 Invasive Plants

A. Incorporate the standard contract provision that require cleaning of equipment. In order to prevent the spread of invasive plants, all equipment would be cleaned of dirt and weeds before entering National Forest System lands. This practice would not apply to service vehicles traveling frequently in and out of the project area that would remain on the roadway.

B. The process for locating all landings or stockpile locations would be coordinated with a Forest Service noxious weed specialist to insure these locations are not within any currently established noxious weed populations. If necessary, pre-treat existing landings and skid trails that may be used for project implementation where existing infestations present an unacceptable risk of spreading established invasive plant populations.

C. Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed free by Forest Service noxious weed specialists.

2.3.9 Cultural

A. In accordance with 36 CFR 800 and Section 106 of the National Historic Preservation Act (1966), all known cultural and archaeological sites within the project planning area which are eligible or potentially eligible (unevaluated) for listing on the National Register of Historic Places (NRHP) will be protected throughout the life of the project so that there are no adverse impacts caused by project activities.

B. Archaeological site boundaries will be flagged for avoidance. A map will be provided to the project lead prior to implementation with buffered site boundaries labeled as "Sensitive Resource – Area to Protect." The project lead will consult with a Forest Service Archaeologist on locations of equipment staging and access routes and any modifications in project location or design before any activities proceed.

C. A qualified cultural resource specialist(s) working under the direct supervision of an archaeologist meeting the Secretary of the Interior's professional qualification standards will conduct on-site monitoring during project activities occurring in or adjacent to areas modeled as 'high probability' under the Mount Hood National Forest Cultural Resource Inventory Plan (Burtchard, Greg C. and Keeler, Robert W. *Mt. Hood Cultural Resource Reevaluation Project.* Laboratory of Archaeology and Anthropology, Portland State University, 1994).

D. If during project activities cultural material is encountered, all work will cease immediately and a Forest Service Archaeologist will be contacted to evaluate the inadvertent discovery. A mitigation plan, if needed, will be developed in consultation with the Oregon State Historic Preservation Office (SHPO) and Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO), Tribal Historic Preservation Office (THPO).

E. All on-site monitoring will be documented in the Forest Service Heritage database. Any additional sites discovered during monitoring, or significant changes to the boundary or character of previously documented sites will be recorded in the SHPO site record form and submitted to SHPO.

F. Under continuing consultation and approval of the Mt Hood National Forest Heritage Program, install interpretive signs describing the history of the Dog River aqueduct along the Surveyors Ridge and Cook's Meadow Trails.

G. Under continuing consultation with Oregon SHPO and the Mt. Hood Heritage Program, as a separate facilities maintenance undertaking, repair and stabilize the Dog River Headworks Log Cabin. This may include amendments to and repair of the foundation, excavating the hill slope away from the cabin, leveling the cabin, replacing deteriorating logs, and re-shingling the roof with cedar shakes. Or;

    1. Repair the cabin and place it on a new foundation set back from the access road to protect it from traffic damage.

2. Repair the cabin, transport it to The Dalles, and place it on a new foundation in a City park.
3. File a copy of this report and site forms with the Wasco County Museum and the Hood River County Museum on archival paper.

H. If during project activities cultural material is encountered, all work will cease immediately and the Zone Archaeologist will be contacted to evaluate the inadvertent discovery. A mitigation plan, if needed, will be developed in consultation with the Oregon State Historic Preservation Office (SHPO) and when appropriate, the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO), Tribal Historic Preservation Office (THPO).

Chapter 3 – Environmental Consequences

This chapter presents information on the physical, biological, social, and economic environments of the affected planning area, and the potential direct, indirect and cumulative effects to those environments due to the implementation of the alternatives. Each resource area discloses the direct, indirect and cumulative effects for that resource area.

The Environmental Assessment hereby incorporates by reference the project record (40 CFR 1502.21). The project record contains specialist reports, biological evaluations, and other technical documentation used to support the analysis and conclusions in this Environmental Assessment. Specialist reports, which are incorporated by reference, were completed for resources. Separate biological evaluations were completed for aquatic, terrestrial wildlife, and botanical species. Also, biological assessments were completed for fish and wildlife. Full versions of these reports are available in the project record.

Each of the analyses conducts cumulative effects analysis resulting from this project. The table below lists projects considered in the cumulative effects analyses.

Table 1. Projects that the IDT considered in analyses.

Past Activities
The Dalles Watershed Fuels Reduction, Phase I and II
Timber harvests on federal, county and private lands (including associated road/landing construction)
Road decommissioning and road closures
Aquatic restoration projects
Cooks Meadow Trail relocation
Ongoing Activities
The Dalles Watershed Fuels Reduction, Phase I and II
Polallie Cooper Fuels Reduction
Timber harvests on federal, county and private lands (including associated road/landing construction)
Road decommissioning and road closures
Dog River Pipeline and Crow Creek Reservoir ongoing operations
Pre-commercial thinning
Dog River Trail relocation
National Forest System road and trail maintenance
Site-specific noxious plant treatments
Surveyors Ridge Trail relocation
Surveyors Ridge Trail maintenance
Highway 35 road maintenance and sanding
Dufur Mill Road (4400) maintenance

Snowmobile use
Developed and dispersed campsites
Future Activities
Timber harvests on federal, county and private lands (including associated road/landing construction)
The Dalles Watershed Fuels reduction activities
Re-issuance of The Dalles Watershed special use permits

3.1 Vegetation Resources

3.1.1 Existing Condition

The proposed project area is dominated by three plant associations, Grand fir (A*bies grandis*)/vine maple (*Acer circinatum*)/vanilla leaf (*Achlys triphylla*) (A1), Grand fir/queencup beadlily (*Clintonia uniflora*) (A2), and grand fir/vanilla leaf (A3). Common to the moist mix conifer plant associations (A1, A2, and A3) the overstory would be dominated by Douglas-fir (*Pseudotsuga menziesii*), grand fir, and ponderosa pine (Pinus ponderosa) and the understory would be dominated by a variety of shrubs like Oregongrape (*Berberis nervosa*), serviceberry (*Amelanchier alnifolia*), vine maple, greenleaf manzanita (*Arctostaphylos patula*) (refer to Table 2). Currently ponderosa pine is only representing less than 20% of the overstory component and very little to no shrub component is present in the stands due to high stand densities. Site productivity within the project area range in site indices between 125 to 135 feet on moderate to highly productive sites. They are usually found on moderate slopes with an average elevation between 2,800 to 5,300 feet.

Table 2 Existing Acres by Plant Association within Proposed Project Area.

Stand Group	Plant Association	Approximate Acres within proposed project area
A1	Grand fir/vine maple/vanilla leaf	32
A2	Grand fir/queencup beadlily	9
A3	Grand fir/vanilla leaf	4
TOTALS		45

Currently, the project area contains a mix of stands of immature commercial plantations less than 80 years old, sapling age plantations less than 30 years old in moist mix conifer plant communities and recently unmanaged stands (RUS) over 80 years old in both moist and dry mix conifer plant communities. The majority of the plantations, sapling and commercial, are in the stem exclusion stage dominated by small to medium size material with a quadratic mean diameter (QMD) ranging from 3 to 12 inches and an average height of 60 feet in the commercial plantations and 35 in the sapling plantations. The recently unmanaged stands range in age from 90-200 years old and are dominated by stands in the reinitiation stage in both the moist and dry mix conifer plant communities. The QMD within the RUS range from 5-12 inches in the moist mix conifer and 5-14 in the dry mix conifer with an average height range in both of 70-120 feet. Regeneration in the RUS is dominated by shade tolerant species like grand fir and western hemlock and is averaging around 700 trees per acre. Stands have an abundance of ladder fuels built up in the understory with very little to no shrub component.

3.1.2 Effects Analysis

No Action Alternative

Under the No Action alternative, stands would continue to progress through natural successional stages that are already occurring. There would be no forested lands removed. This alternative would have no effect on vegetation resources.

Proposed Action Alternative

Live and dead trees would be cut, in order to facilitate constructing the new pipeline. Removal of trees would vary depending on site and slope to accommodate the new pipe. Tree sizes would typically range in diameter from 5 inches 26 inches DBH and from 10 feet to 120 feet tall. With less than 50 acres of forested land being treated in the above mentioned plant communities there would be no considerable change in the forest structure for the plant association within the analysis area. During the tree removal process all residual trees would be protected from major damage. Overall, this alternative would have no considerable effect on vegetation resources.

All logging activities would be ground based operations. Existing landing and skid trails would be utilized to move the pipe material when possible. All merchantable (8”-23.9” DBH) trees removed would be staged near open roads for future removal. To meet wildlife habitat requirements, approximately 5% of the largest cut trees (boles only) would be left on site.

Cumulative Effects

For this cumulative effects analysis, all projects shown in the Cumulative Effects Table 1 were considered; however, only projects with effects to vegetation within the project area were analyzed, such as timber and fuels management activities. Since the Proposed Action would result in no measurable change to forested land or plant communities, there would be no cumulative effects for vegetation resources.

3.1.3 Consistency Determination

NFMA Findings for Vegetation Manipulation

As required by regulations (FSH 1909.12 5.31a), “all proposals that involve vegetative manipulation of tree cover for any purpose must comply with the seven requirements found at 36 CFR 219.27(b).” All of these requirements are met by the project (refer to project record).

Suitability for Timber Production

The primary objective of the proposal is fuel reduction rather than timber production. However, as a pre-cursor to the silvicultural diagnosis process, stand examinations are conducted to determine existing stand conditions, and a determination of suitability (in regard to management of the stand for timber production) is made for each stand. Stands proposed for harvest treatment were examined for suitability in accordance with 36 CFR 219.13, Timber resource land suitability. Stands were found to be suitable for timber management based upon the following:

Meet the definition of forestland as described in 36 CFR 219.3.

Technological feasibility exists to ensure soil productivity and watershed protection. All sites considered for treatment would use established harvesting and site preparation methods. In combination with resource protection standards in the Forest Plan and applicable Best Management Practices, these methods would be sufficient to protect soil and water resource values.

There is reasonable assurance that lands could be restocked within 5 years of final harvest (this generally does not apply to the proposed harvest units, as they would be thinned. Small openings in root disease pockets would be regenerated with rot resistant species).

Maximum Harvested Acres (36 CFR 219.12 (k)(5)(iii), 219.27 (d)).

Ensure that no timber harvesting occurs on lands classified as not suited for timber production, except for salvage sales or sales necessary to protect other multiple-use values where the Forest Plan establishes that such actions are appropriate (36 CFR 219.27 (c) (1)). The proposed actions meet the forest plan requirement for less than 40 acres of created openings.

Mt. Hood National Forest Land and Resource Management Plan (Forest Plan)

All of the action alternatives proposed would meet the goals and objectives of the Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) as defined by B-2, Scenic Management Area Direction, B-6, Special Emphasis Watersheds, and C-1, Timber Emphasis as amended, including Standards and Guidelines, Northwest Forest Plan, and Survey and Manage 2001 Record of Decision

Watershed impact areas should not excee "thresholds of concern (TOC) calculated for each of the special emphasis watersheds. (B6018-020).

Forest Plan guidelines advise that no more then 25% TOC for Upper Dog River be impacted by timber management activities. The proposal is consitant with this standard with less than 1% of the watershed being impacted by the proposed tree removal and piping.

Suitability for even-aged and uneven-aged management

Forest Plan guidelines advise against uneven aged management in stands with dwarf mistletoe and/or root disease. Even-aged management is the effective way to manage dwarf mistletoe and root disease). (Forest wide Standards (FW) 316 and 317), (C1-019-021),(C1-024). Created openings should be no more than 2 acres (FW 323 and 324) and should be focused in areas of stands that are diseased, infested with damaging insect populations, or damaged by storms (C1-022).

The Forest Plan states "However, silvicultural prescriptions may specify appropriate mitigation measures in Management Areas where uneven-aged management is being considered to fulfill resource objectives other than timber production." (Mt. Hood FP Four-88)(FW 318-347). The resource objective here is fuel reduction while maintaining structure for aesthetics, wildlife, nutrient cycling, and future stand composition and health (FW 148-169). Project design features/mitigation measures such as patch openings, and risk of windthrow are written into the design of the proposed action to meet Forest Plan direction.

3.1.4 Summary of Effects

The Proposed Action would result in no considerable direct, indirect, or cumulative effects to vegetation resources. With less than 50 acres of forested land being treated in the above mentioned plant communities there would be no considerable change in the forest structure for the plant association within the analysis area.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.2 Soil Productivity

3.2.1 Existing Condition

Several field reviews have occurred during the planning lifespan of the project and no soils related issues were discovered.

Currently, there are sufficient levels of effective groundcover across and adjacent to the proposed area of disturbance since no unusual erosion was observed.

Soils across the planning area have been derived from numerous ashfall deposits, primarily from Mt. Hood eruptions. Prevailing winds have a south or west component to them and as the mountain would erupt, ash clouds would be carried downwind and deposited across the entire planning area. Wind, precipitation events, and landslides continue to alter the original depositional pattern by removing ash completely in some places exposing bedrock, and depositing it in others resulting in very thick ash deposits. Soil characteristics are generally similar under the forested terrain across the length of the pipeline footprint.

The soil in the project area is identified as SRI soil map unit 168, with a moderate compaction hazard and surface erosion potential. As explained above, erosion rating of moderate which is based upon *bare* soil (no vegetative or duff cover). The compaction hazard is estimated as moderate, and the susceptibility to soil displacement is high.

3.2.2 Effects Analysis

No Action Alternative

Soil Erosion Risk

The risk of erosion within the analysis area would remain unchanged because the amount of groundcover protecting the soil surface from erosional influences is common and widespread. The expected effect is the landscape would respond and change proportionate to the severity of natural events, such as storms or wildfire.

Detrimental Soil Conditions

It is assumed that soils damaged by previous activities would continue to recover and change at an unknown rate as roots, animals, and other influences slowly break up existing compaction. The effect of soil recovery is a gradual increase in available soil (therefore nutrients and water) for all normally expected soil biological, chemical, and physical functions to occur.

Organic Matter Levels

Soil organic matter and corresponding soil functions would continue without much change. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events, such as storms or wildfire. In addition, organic matter decomposition is influenced substantially by temperature, moisture, and fire, thus the rate of decay and cycling would continue accordingly.

Proposed Action Alternative

Soil erosion risk

No active erosion from previous management was observed during the field reconnaissance for this project. The project footprint is expected to meet the effective groundcover standard following ground disturbing activities.

Detrimental soil conditions

Soils within the disturbance footprint, and especially the pipeline installation itself, will remain in an intentionally detrimental condition, much like a permanent road. Given the thin, linear nature of the impact, it is not expected to have a measurable effect on the surrounding forest in terms of growth or sustainability.

Organic Matter Levels

Soil organic matter and corresponding soil functions would continue without much change. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events, such as storms or wildfire. In addition, organic matter decomposition is influenced substantially by temperature, moisture, and fire, thus the rate of decay and cycling would continue accordingly.

Direct and Indirect Effects

Soil Erosion Risk

Soil erosion risk would increase with the Proposed Action because bare soil would be exposed during implementation. As the amount of bare, bare/compacted soil increases, so does the risk of soil movement. Actual resource impairment (erosion and/or sedimentation) is dependent on weather events that provide the energy to move soil material from one location to another. In order to diminish this risk while soils are exposed, certain erosion control techniques are practiced to lessen erosive energies. The effectiveness of these 'Best Management Practices', or BMPs, is discussed by Rashin et.al. (2006) in an applicable publication of the Journal of the American Water Resources Association. Comparing the Proposed Action to their application of studied BMPs would indicate that the proposed project and associated design criteria would substantially reduce the risk of resource damage should a storm event occur while the ground is exposed. For example, the study showed an assessment of surface erosion and sediment routing during the first two years following a timber harvest activity indicated a 10 meter (approximately 30 feet) setback from ground disturbance can be expected to prevent sediment delivery to streams from about 95 percent of harvest related erosion features. Therefore, by maintaining proper amounts of protective groundcover along with BMPs and PDCs, the risk of erosion and subsequent sediment delivery caused by the Proposed Action is extremely small.

Detrimental Soil Conditions

Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas, but is not expected to result in a measurable decrease in site productivity.

Organic Matter Levels

Sufficient tonnage is expected to remain on site to provide for organic matter input to the ecosystem once all activities are complete.

Cumulative Effects

Potential cumulative effects projects from cumulative effects in Table 1 have been reviewed and no projects overlap in either time or space within the soils analysis areas, therefore there are no effects to accumulate from these projects.

The effects of leaving the existing pipeline in the ground (pollution from tar and galvanized wire) was analyzed.

The concentration and extent of pollutants that could be generated by leaving the existing pipeline abandoned underground would be expected to be very low and localized. Materials that were originally used to assemble the wooden pipeline included galvanized wire and tar (presumed to be coal tar pitch). Being manufactured materials, consideration has been given to the potential for their toxicity to the environment. They have been in place for over 100 years, and remain around the outer surface of the pipeline.

The galvanized wire has been subject to corrosion from underground weathering and oxidation. Soils the pipeline is buried in exhibit pH values that are slightly acidic (greater than 6.0, but less than 7.0, SRI 1979). So the corrosion potential is considered to be relatively low. The rate of breakdown has been, and would continue to be very slow. Any oxidation of metals such as iron, tin, and zinc would generate minute particulate, with a likelihood to become adsorbed into the soil. The potential for it to become mobile and available for soluble transport in a concentrated form for uptake or ingestion in toxic quantities is very low to unlikely.

The tar would not be expected to be soluble in the soil-water matrix. Chemical reaction to soil-water and mineral content would be considered to be very low. Any degradation by sunlight would be unlikely. Breakdown of phenols and hydrocarbon compounds in the tar would be expected to be infinitesimal. The likelihood that toxic concentrations would form and become mobile and available for uptake or as a pollutant would be considered to be very low.

3.2.3 Consistency Determination

The Proposed Action is consistent with all applicable laws, regulations, and Forest Plan guidance.

3.2.4 Summary of Effects

The project footprint is expected to meet the effective groundcover standard following ground disturbing activities. Soil erosion risk would increase with the Proposed Action because bare soil would be exposed during implementation. Given the thin, linear nature of the impact, it is not expected to have a measurable effect on the surrounding forest in terms of growth or sustainability. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events, such as storms or wildfire. Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas, but is not expected to result in a measurable decrease in site productivity. Sufficient tonnage is expected to remain on site to provide for organic matter input to the ecosystem once all activities are complete.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.3 Hydrology

3.3.1 Existing Condition

The affected area for the Dog River Pipeline Replacement Project includes the Dog River and South Fork Mill Creek subwatersheds located on the eastern side of the northern Cascade Mountains of Oregon. Both Dog River and South Fork Mill Creek are low- to mid-elevation streams that eventually drain into the mid-Columbia River. Dog River is located to the southeast of the town of Parkdale, Oregon; and the South Fork Mill Creek is situated to the southwest of The Dalles (Figure 1).

The hydrologic regime in each of the subwatersheds is dominantly snow, supplemented by rain and groundwater. The principle runoff season occurs in spring months and is fed by an average persistent winter snowpack of about 80 to 100 inches at the highest elevations (CTD 2017). Additional precipitation in the form of rain occurs primarily in late fall and winter months. High intensity winter precipitation events can also drive peak flows. Given that the watersheds partially sit within the transient snow zone between 2,500 to 5,000 feet elevation, periodic rain-on-snow events can cause rapid snowmelt and heavy runoff, often resulting in unusually high peak flows. Ordinary peak flows are most commonly attributable to spring snowmelt. Snowfall typically accumulates between November and late March, and melts out beginning in April and ending usually by early or mid-June. Base flows are maintained by perennial tributaries and groundwater inputs from springs and wetlands.

Dog River

The Dog River subwatershed comprises about 8,142 acres (12.7 sq. mi.). The highest elevation of the subwatershed is the top of Lookout Mountain at 6,525 feet, and the lowest elevation is at the mouth of Dog River at about 2,105 feet. The long-axis of the subwatershed is oriented primarily south to north, being nearly 10 miles long and about 2 miles wide at its widest. Dog River flows north from its origin at the wet meadow known as High Prairie to its confluence with the East Fork of Hood River (EFHR), a principle tributary to Hood River, which is tributary to the Columbia River. The subwatershed is made up of four smaller nested perennial catchments: Lower Dog River, Puppy Creek, Brooks Meadow Creek, and Upper Dog River. Average precipitation in this subwatershed has historically ranged between 55 inches annually at the lowest elevation in the Lower catchment, to 75 inches at the higher elevations in the Upper catchment (Figure 4).

The Lower Dog River catchment comprises 62 percent (5,507 acres) of the larger Dog River subwatershed. Terrain of the lower catchment is typified by a steeply sided narrow canyon that is dissected by a number of high gradient intermittent/ephemeral streams, and several perennial tributaries. It contains the perennial main stem of Dog River between stream miles 0.0 at the mouth and 5.5 at Cooks Meadow. Stream surveys document a number of unmapped and unnamed springs, particularly along the left stream bank (as facing downstream) between river mile (RM) 1.9 and 5.0. There is a 60 foot waterfall located at RM 2.6 that is considered a barrier to passage by fish. At the higher end of this catchment the Dog River pipeline traverses mid slope around Dog River Butte before entering the South Fork Mill Creek subwatershed. About 96 percent of the Lower catchment is located within the bounds of the Hood River Ranger District of the Mt Hood NF, the remaining 4 percent near the mouth is non-Federal ownership.

The Brooks Meadow catchment is tributary to the Lower catchment below the City's pipeline intake, and makes up about 11 percent of its area. Terrain is gentle and nearly level, being mostly the wet feature known as Brooks Meadow. Brooks Meadow Creek flows perennially into Dog River at about RM 5.4 just below Cooks Meadow. The Dog River pipeline crosses underneath Brooks Meadow Creek several hundred yards upstream from its confluence with Dog River. This catchment is within the Barlow Ranger District.

The Puppy Creek catchment is also tributary to the Lower catchment below the City's pipeline intake, and makes up about 28 percent of its area. Terrain in this catchment is very steep and highly dissected, except for the uppermost segment of the main stem of Puppy Creek which is broad and gently sloped. Puppy Creek flows perennially into Dog River at RM 0.2. This catchment is within the Hood River Ranger District.

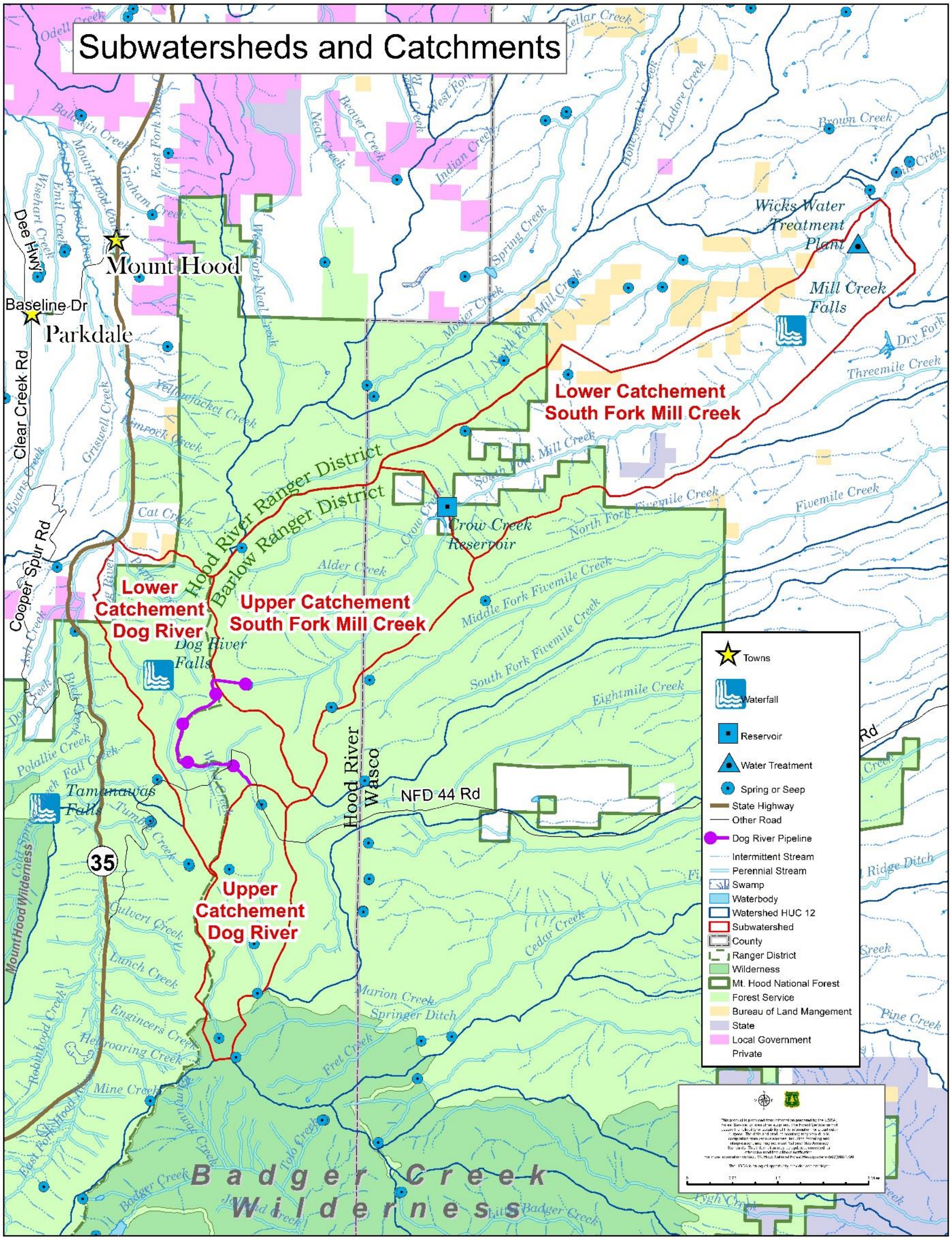
The Upper Dog river catchment comprises 38 percent (3,085 acres) of the larger Dog River subwatershed. Terrain of the upper catchment is somewhat uniform and broad, gently rounded, weakly dissected, and moderately sloped. It contains the mostly perennial main stem of Dog River between RM 5.5 at Cooks Meadow and 10.7 at High Prairie. There are a number of named and unnamed perennial springs and wet meadows, including Agnes Spring, Blue Bucket Spring, Dog River Spring, and High Prairie. At the lower end of the catchment is located the City of the Dalles diversion and the intake for the Dog River Pipeline at RM 6.0. The Upper catchment is located within the bounds of the Barlow Ranger District, as well as the designated Dalles Muncipal Watershed and is 100 percent federal ownership.

For context at a larger scale, the Dog River 12th-field subwatershed is the smallest of four that make up the larger East Fork Hood River watershed (72,337 acres), comprising only 11 percent of its contributing area above the confluence with the Middle Fork Hood River. Each of the other three contributing subwatersheds is more than twice the size of the Dog River subwatershed.

Dog River subwatershed is mostly forested and dominated with conifers. Past management has included commercial activities such as road development and timber harvest. But there have not been any new road construction or regulated timber harvest in over two decades. More recently, recreation use in the subwatershed has increased considerably, particularly mountain biking on the Dog River, Surveyor's Ridge and Cooks Meadow trails.

The Watershed Condition Framework is a national forest-based, reconnaissance-level evaluation of watershed condition. In 2016, the overall condition class rating for the Dog River 12th-field subwatershed was, "Functioning At Risk". A number of indicators that rated in the "fair" condition category contributed to this overall rating, including: listed as "impaired" (for iron) on DEQ's 303(d) list, altered hydrologic regime, and forest insect and disease issues.

Figure 4. Dog River Pipeline Project Subwatersheds and Catchments.



South Fork Mill Creek

South Fork Mill Creek subwatershed comprises about 18,240 acres. The highest elevation is about 5,050 feet on Mill Creek Buttes to about 740 feet at the confluence with North Fork Mill creek approximately 7 miles downstream from the National Forest Boundary. The long-axis of the subwatershed is oriented primarily southwest to northeast, being a little more than 16 miles long and 3 miles wide at the widest. The South Fork Mill Creek flows northeast from its headwaters in the Mill Creek Buttes area to its confluence with the North Fork Mill Creek to form Mill Creek, a direct tributary to the Columbia River. The South Fork Mill Creek subwatershed can be subdivided into two nested catchments: the Lower catchment and the Upper catchment. Average precipitation in this subwatershed has historically ranged between about 60 inches annually at the higher elevations in the Upper catchment, to 17 inches at the lowest elevations to the east in the Lower catchment (Figure 4).

The Lower South Fork catchment below Crow Creek dam comprises 55 percent (10,112 acres) of the subwatershed. The terrain is a long, steep sided, dissected corridor canyon. The subwatershed contains the perennial main stem of South Fork Mill creek between RM 0 and 11.4. There are no perennial tributaries to the stream in the Lower catchment. Mapped springs include Saddle and Schoolmarm. Between RM 8.4 and 11.4 the stream flows through non-federal in-holdings. The Forest boundary is at RM 11.4, all ownership in the subwatershed below that is non-federal. About 65 percent of the Lower catchment is non-Federal ownership, including a large tract of private industrial forest lands. The Wicks water treatment plant that supplies the City of The Dalles with municipal water is located about a mile and a half above the confluence with the North Fork of Mill creek. About a mile and a half above that is Indian Hollow, where there is a waterfall that is a barrier to fish passage.

The Upper South Fork catchment above Crow Creek dam comprises 45 percent (8,128 acres) of the subwatershed. Terrain is mountainous, variably dissected, and moderately steep to steep, being dominated by Mill Creek Buttes. The subwatershed contains the perennial main stem South Fork Mill between RM 11.4 and 15.9. Alder Creek is a perennial tributary to perennial Crow Creek, which flows into Crow Creek Reservoir about a half-mile northwest of the inflow of South Fork Mill Creek. Outflow from the Dog River pipeline deposits into a tributary to the South Fork Mill at about RM 15.7. Mapped perennial springs include Shellrock and Stroud, which are tributary to Crow Creek and South Fork Mill Creek respectively. About 93 percent of the Upper Catchment is in Federal ownership, and is entirely on the Barlow Ranger District.

For context at a larger scale, the South Fork Mill River subwatershed comprises 65 percent of the larger North Fork – South Fork Mill 12th-field, 27,938-acre subwatershed. Both the North Fork and South Fork of Mill Creek merge to form one of nine subwatersheds that make up the larger Mid-Columbia/Mill Creek 10^{th}-field watershed.

The South Fork Mill subwatershed is mostly forested and dominated with conifers, except for the eastern third which is comprised of a drier ecotype of scrub-oak and juniper. Past management has included commercial activities such as road development and timber harvest. There has not been any new road construction in the subwatershed in many years. Since 2005 there has been a notable amount of vegetation management in the subwatershed, particularly on Federal lands, where the City of The Dalles and the Forest Service have mutually endorsed the thinning of dense forest to reduce fuels and minimize the risk of the municipal watershed being subjected to the effects of high-severity wildfire. Salvage of fire-killed timber has also occurred on privately owned industrial forestlands after the 2013 Government Flats fire.

The Watershed Condition Framework overall condition class rating for the North Fork – South Fork Mill 12th-field subwatershed in 2016 was, “Functioning At Risk”. A number of indicators that rated in the “fair” condition category contributed to this overall rating, including: altered hydrologic regime, some unstable stream banks, low abundance of in-stream woody debris, loss of cover by recent wildfire, and forest insect and disease issues.

The Dalles Municipal Watershed

The Dalles municipal Watershed (DMW; Figure 5) is an approximately 24,000 acre designated management unit and source water protection area. Lands within the DMW encompass the upper catchment of Dog River above the pipeline intake, the pipeline where it is routed around Dog River Butte, Brooks Meadow, and the entire South Fork of Mill creek extending down to the Wicks water treatment Plant located eight miles downstream of the Crow Creek dam. Water diverted and transferred from the upper catchment of Dog River to the South Fork Mill creek, the waters of South Fork Mill Creek itself, Crow Creek, Alder Creek, and contributing waters from springs flow into Crow Creek Reservoir. The reservoir allows for controlled release down the South Fork of Mill creek to the Wicks water treatment plant. The earthen Crow Creek dam was constructed in 1967.

Because much of the municipal water supply originates from Forest Service System lands, a cooperative agreement was signed between the United States Department of Agriculture and the City of The Dalles in 1912 for the purpose of conserving and protecting it within a specified area that includes both Federal and non-federal ownership. The intent of the 1912 Agreement was formalized again in 1972 as per Forest Service Manual 2542 with a Memorandum of Understanding (MOU) between the City of The Dalles and the Mt. Hood NF to maintain and protect the quality and quantity of water originating from National Forest System lands for municipal use. It included management directions and a ten-year management plan for both Federal and City owned lands. As per the MOU, the DMW remains closed to public entry except for a set number of walk-in hunters during selected fall big-game seasons. Roads are closed to all except for administrative use.

Due to the high value beneficial use of Dog River (drinking water), the intent of the 1972 MOU was carried forth into the Mt Hood National Forest (MHNF) Land and Resource Management Plan (LRMP) of 1990 according to Forest Service direction (FSM 2542, 2007), and National Forest System lands were designated further as a Special Emphasis Watershed, with management standards and guidelines.

Then in 1994, when the Northwest Forest Plan was adopted, all of the DMW and portions of neighboring watersheds were included into the Mill/Fivemile/Eightmile Tier 1 Key Watershed management allocation, which on Federal lands is intended to maintain and protect watersheds that contribute to anadromous fish habitat. The upper catchment of Dog River was included in the Tier 1 designation because of the pipeline which transfers water to South Fork of Mill Creek and eventually Mill Creek where there is listed steelhead habitat.

In January of 1996 the City requested that the Forest Service reclassify the municipal watershed from a Tier 1 Key Watershed to a Tier 2 because of concerns about administrative barriers that could potentially arise if any future development or enhancements to their infrastructure were to be proposed. But the watershed analysis conducted for Mill Creek in 2000 determined that with either designation, standards and guidelines would be applied to a proposed activity to ensure consistency with the Northwest Forest Plan and the Key Watershed allocation. Likewise, exceptions could preclude application of standards and guidelines under either the Tier 1 or Tier 2 Key Watershed designation if they contradict existing law or regulation (MHNF 2000b).

Management of natural and cultural resources on Forest Service System lands within the DMW is administered by the Forest Service, whom collaborates with the City of The Dalles as per the MOU. Operations of the City’s facilities located on National Forest System lands, such as the Dog River pipeline and Crow Creek Reservoir, are authorized via Special Use Permit, also administered by the Forest Service.

However, the use and management of the water that originates in the DMW for municipal purposes is administered by agencies of the State of Oregon. Water rights in the name of the City and municipal use in the DMW fall under the jurisdiction of the Oregon Water Resources Department (OWRD). In Chapter 690 of the Oregon Administrative Rules, Division 504, the Hood Basin Program, sub-section (1)(a), Dog

River above its point of diversion is classified exclusively for municipal use (OAR 2019). The quality of the water that is used as a designated drinking water supply in the DMW falls under the jurisdiction of the Oregon Department of Environmental Quality (ODEQ). In response to requirements of OWRD and ODEQ, the City of The Dalles prepared a master development plan in 2006 (CTD 2006)for the management of their municipal water supply, which addressed principally their drinking water system. In 2014, the City also prepared a Water Conservation Management Plan (CTD 2014), which was required by OWRD as a condition of being a municipal water supplier.

In 2013 the Government Flats wildfire burned across about one-third of the Municipal Watershed, mostly in the lower catchment. About 100 acres were on Federal lands, the remainder were on non-federal lands.

3.3.1.1 Stream Network and Channel Condition

Dog River

There are approximately 28 total miles of stream channel mapped within the Dog River subwatershed. About 63 percent (17.5 miles) are characterized as flowing perennially. The total length of the main channel of Dog River is about 10.7 miles long. About 86 percent of that total length flows perennial in most years. The other 14 percent flows intermittently, and includes two short sub-reaches that amount to about 1.5 miles in length. They include the uppermost mile, where streamflow tends to dry up mid-summer to mid-fall. The other is immediately downstream from the pipeline diversion, which dries up for about a half-mile when the total flow in the river is diverted, typically from early July until late October. Just below this sub-reach, flow usually surfaces again in Dog River where it flows through Cooks Meadow.

An August 2000 Stream Survey (MHNF 2000a) differentiates Dog River into four unique stream reaches extending from its mouth to its headwaters (Figure 5). Reach 1 extends about 1.8 miles up from the mouth of Dog River, and Reach 2 extends further upstream to near FSR 44. These two lower reaches make up the main channel in the lower catchment of Dog River below the pipeline intake. Their gradient is generally steep, averaging about 9 percent (Table 3).

Most of Reach 1 and all of Reach 2 are very confined in a narrow v-shaped valley with steep canyon walls. The lowest segment of Reach 1 near the mouth is moderately confined as it issues from the upstream canyon into the East Fork Hood River valley. Floodplain features in the upstream canyon are generally narrow, alternating, and sometimes absent on steep sections of the channel. The bankfull width of Reach 1 averaged about 18.2 feet, whereas Reach 2 upstream was a bit narrower averaging about 16.7 feet. A channel spanning, 60-foot waterfall is located in reach 2 at about RM 2.6.

Reaches 3 and 4 occupy the Upper Catchment of Dog River between FSR 44 and the headwaters at High Prairie. These two upper reaches make up the main channel of the upper catchment. The gradient of Reach 3 is shallow, averaging about 3 percent, while the gradient of Reach 4 is steep averaging 10 percent. Reach 3 is moderately confined in a gentle, trough-like valley form that transitions upstream in Reach 4 into a moderately confined mountain ravine. Floodplain features in Reach 3 are common, defined and in places connected to small wet meadow features, and in Reach 4 they are more narrow with split channels or nonexistent. Bankfull width in Reach 3 averaged about 13.5 feet, and narrowed notably in Reach 4 to about 9.3 feet.

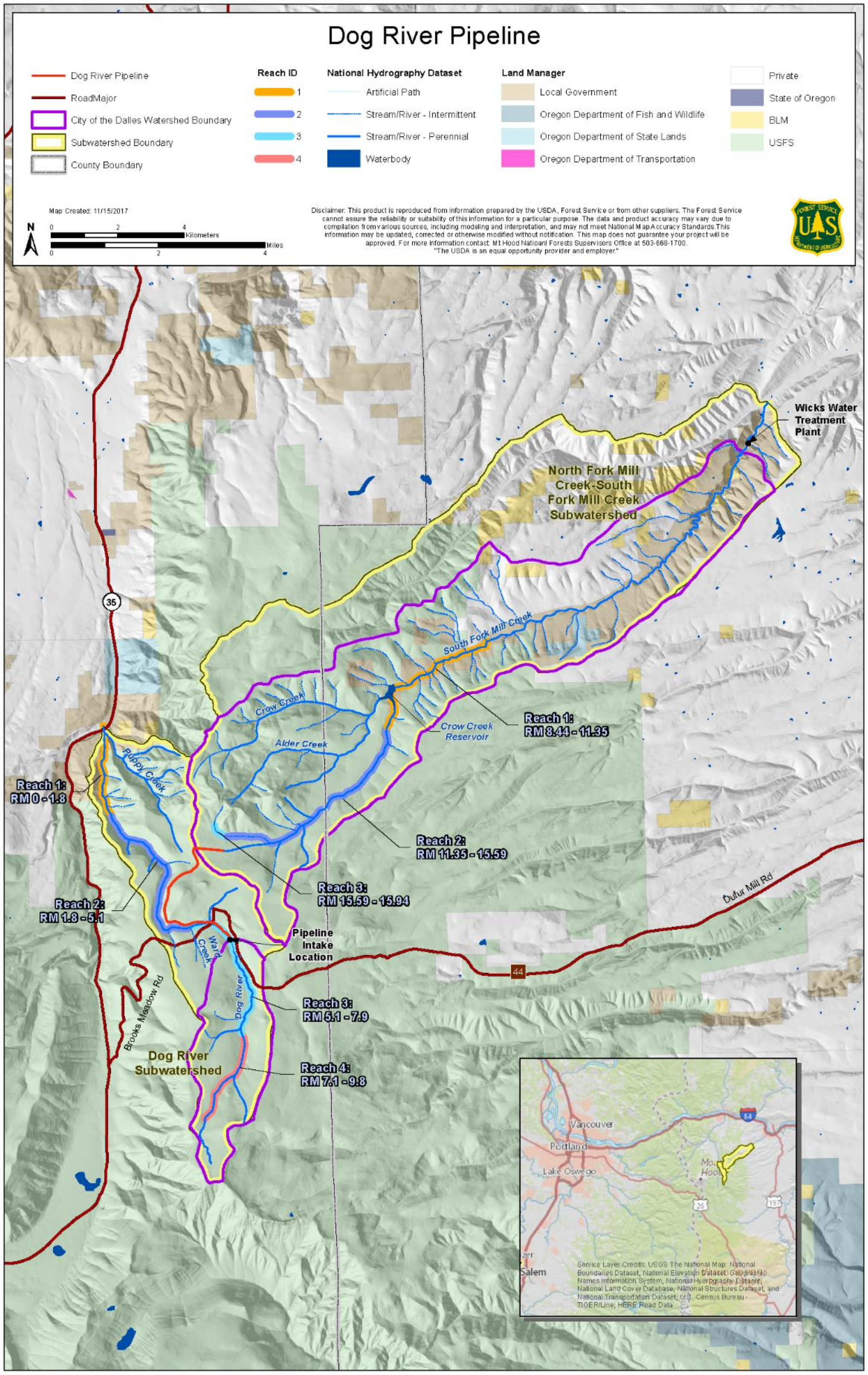
In Reaches 1 and 2 there were 9 tributaries that were contributing flow to Dog River when surveyed in late July. It was estimated by surveyors that they were contributing as much as 25 percent of the stream flow at the time of the survey. Two of these were the perennial streams of Brooks Meadow and Puppy Creek. The other seven were springs or seeps issuing from near or upslope of the left bank, and the intermittent Ward Creek.

There were 24 tributaries observed in Reaches 3 and 4. All of them were contributing flow to Dog River when observed in late July. Surveyors estimated they contributed the majority of the stream flow observed at that time. Three of the tributaries were unnamed streams fed by mapped springs. Most of the remaining tributaries were unmapped springs or seeps issuing from near or upslope of the right bank.

Reaches 1 and 2 are step-pool channel types (Rosgen “A” channel types), dominated by pools. The lower reach had 36 total pools, and Reach 2 had 42. There were 10 primary pools observed in Reach 1, and 13 observed in Reach 2. The depth of the primary pools in both reaches was measured to be greater than 2 feet during summer low flows of July.

Reach 3 is a pool-riffle channel type, and Reach 4 is more of a cascade chute (Rosgen “B” and “A” channel types respectively). There were 61 total pools in Reach 3, but only two were considered to be primary as most were pocket pools. Reach 4 had a total of 67 pools but all were small pocket pools, none of them were concluded to be primary. The majority of the hydraulic controls in the stream consisted of cobble-sized substrate (79%). A combination of wood and substrate controls made up 11 percent of the total pools and wood controls were 10 percent of the total pools. Woody debris was the primary hydraulic control creating pools in both Reaches 3 and 4.

Figure 5. Dog River Diversion Pipeline Project Surveyed Stream Reaches in the Affected Area.



The pool frequencies observed in all four reaches were below standards listed in the LRMP and by NMFS as indicators of properly functioning channel processes. Given however, the small size of this stream and channel type, the formation of deep pools would not be expected because the stream power and discharge to scour deeper and mobilize larger sizes and quantities of substrate is inherently low and infrequent.

Table 3. Select Channel Characteristics of the Dog River Subwatershed.

Reach	Channel Type	Confinement	Avg. Gradient (%)	Avg. Bankfull Width (ft.)	Number of Perennial Tributaries, Springs, or Seeps	Dominant Substrate	Total Pools	Primary Pools
1	step-pool	very confined	7	18.2	1	cobble and coarse gravel	36	10
2	step-pool	very confined	11	16.7	8	bedrock and gravel	42	13
3	pool-riffle	moderately confined	3	13.5	8	coarse gravel	61	2
4	cascade	confined	10	9.3	16	small cobble	67	0

Source: MHNF 2000a

Substrate in Reach 1 was dominated by small cobbles and coarse gravel, while Reach 2 was primarily bedrock and coarse gravel. Sampling estimated that fine sediment amounted to 8 and 14 percent respectively of the total substrate. Substrate in Reach 3 was dominated by coarse gravel, and Reach 4 was dominated by small cobbles. Estimated fine sediment that was sampled amounted to 12 and 6 percent respectively of the total substrate.

There were 23 side channels identified in all four reaches, with an average depth of 0.8 feet, an average length of 97 feet, and an average width of 5 feet. Most were observed in Reach 4.

Data from the 2000 stream survey of Dog River indicated that the overall abundance and density of in-stream large woody debris in all reaches of Dog River was low to moderate (Table 4). Small wood comprised 52 percent of the total wood counted in the stream channel at the time of the survey. Some of the small wood was a component of debris jams, but the majority of it was found as individual pieces. The density of medium and large pieces of in-stream wood did not meet the LRMP standards for woody debris density in any reach. It did however, meet the NMFS woody debris density standards for all reaches.

Table 4. Number of in-channel woody debris and woody debris density (total of both medium and large size classes) observed in the 2000 Dog River stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	71	40	78	189	16.7	26.7	43.4	106	20
2	119	47	55	221	18.6	21.7	40.3	106	20
3	226	123	47	396	39.2	15	54.2	106	20
4	153	119	43	315	64.8	23.4	88.2	106	20

Source: MHNF 2000a

There were 103 debris jams counted during the survey of Dog River. Twenty-four percent of the total wood inventoried was in these jams. Of the wood in debris jams, 47 percent was in the small size category, 31 percent in the medium size class, and 22 percent in the large size class.

Since the 2000 survey, there have been additional inputs of in-stream woody debris. Large woody debris recruitment along all reaches of Dog River is good to excellent, with the exception of an upper segment of Reach 1 where a former clear cut had encroached on the riparian zone. There is also an abundance of downed wood within the inner and outer riparian zones on all reaches of Dog River. This material is not typically inventoried during stream surveys. Only in-stream wood was tallied. Overall, it is believed that the abundance of woody debris throughout the system is mostly sufficient to provide structure and function, and that it continues to naturally accumulate unabated like it has for many decades.

Table 5. Number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams observed in the 2000 Dog River stream survey.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	16	52	19	30	10	56	22
2	15	95	24	40	7	44	11
3	22	199	27	108	15	40	7
4	50	99	54	70	49	26	17

Source: MHNF 2000a

There are three crossings where Dog River is diverted under a road. The first is where Highway 35 crosses over Dog River at RM 0.1. At this crossing the river flows perennially through a 60-foot long, double cement box culvert. The second crossing is at RM 5.5 marking the transition between Reach 2 and 3 where the river flows perennially under FS road 44 through 146-foot long, 36-inch diameter corrugated metal culvert. The third is up in the headwaters at the base of High Prairie, where the river is a small intermittent stream that flows under FS road 4420 through a 40-foot long, 18-inch diameter, corrugated metal culvert.

There are two other notable crossings in the subwatershed. One is where the channel of Brooks Meadow Creek flows perennially through a 36-inch diameter, 60-foot corrugated metal culvert under FS road 17. The other is downstream where Brooks Meadow Creek flows across the top of the 12-foot wide gravel service road that parallels the pipeline. The channel at this crossing has been heavily impacted, and flow is sometimes hindered, ponding in wheel ruts before passing across and back into the creek.

Channel types in the two primary tributaries of Dog River (Puppy Creek and Brooks Meadow Creek) are very different. Neither have been formally surveyed. Puppy Creek is mostly very confined and dominantly a very steep gradient. Most of the channel segments are step-pool sequences. There are an estimated 16.9 miles of total channel length in Puppy Creek, of which 46 percent (7.7 miles) are perennial including several first order tributaries. The uppermost reaches of Puppy Creek however, are different, being moderately confined, with much less of a channel gradient. Here the stream is small, and mostly flows intermittently.

In contrast, Brooks Meadow Creek originates and flows perennially through an unconfined wet meadow with a low stream gradient. It is a short stream with about 1.9 miles of channel length. Below the meadow, the channel becomes steeper and moderately confined until it flows through a small forested wetland and then into Dog River.

South Fork Mill Creek

There are approximately 70.2 total miles of stream channel mapped in the South Fork Mill Creek subwatershed above the Wicks municipal treatment plant. About 35 percent (24.6) of those total miles are characterized as flowing perennial. The total length of the main channel of South Fork Mill Creek is nearly 16.5 miles long. About 99 percent of that total length flows perennial. A small perennial spring at RM 15.9 delivers to the headwater channel. The larger-year around contribution to the South Fork of Mill Creek however, is the inflow from the Dog River pipeline, which flows into a headwater tributary channel before entering into the main stem at RM 15.7. Crow Creek Reservoir truncates the main channel between the lower and upper catchments of the South Fork of Mill Creek.

A stream survey of the segments of the South Fork of Mill Creek that flow through Federal lands was conducted in August of 2011. It differentiated the creek into three distinct reaches (Figure 5). Reach 1 begins at the Forest Boundary and extends upstream to Crow Creek Reservoir. It makes up the lower catchment of the South Fork of Mill Creek. The gradient is moderately steep, averaging overall about 4 percent (Table 6). It is very confined by steep-sided ridges that form a narrow canyon. Bankfull width of Reach 1 averaged about 23.2 feet. It was characterized as having many long fast segments with some undercut and unstable banks.

In the upper segment of Reach 1, the channel begins at the outflow at the base of Crow Creek dam. There is leakage at the base of the dam, where several small braids taper off downstream before intersecting with the main channel. The valley here is wider and less confined with less of a gradient, and there are some well-developed floodplain features that interconnect with several forested wetlands. A single 120-foot long, 9-foot wide side channel was observed in one of the forested wetlands. The spillway for Crow Creek Reservoir dumps into the base of an intermittent tributary coming off the hillside and flows into South Fork Mill approximately a quarter-mile below the dam.

About another mile further downstream, the gradient begins to increase and the valley becomes more confined. Most floodplain features become less developed and are more narrow and alternating, except for several small forested wetlands. The downstream terminus of Reach 1 ends at the Forest boundary at RM 11.4. Forest Service crews did not survey downstream of the boundary, but the gradient continues to increase and the canyon narrows as the channel becomes very confined for the next 4 miles until the 60-foot high, channel spanning Mill Creek falls at a chasm feature labeled on maps as Indian Hollow.

Reaches 2 and 3 identified in the survey make up the main channel in the upper catchment above Crow Creek Reservoir. The gradient of Reach 2 is moderately steep, but it increases upstream into Reach 3 where the main channel becomes steep in the upper mountain ravine in Mill Creek Buttes. Both reaches are confined in mountainous terrain. Floodplain features are small and usually alternating. Bankfull width in Reach 2 is about 9.7 feet, narrowing down to 3 feet in Reach 3. There were some unstable stream banks observed in Reach 2, and it was characterized as having many long fast segments.

There were no perennial tributary channels observed in Reach 1, and none are known to be present in the reaches downstream from the Forest boundary. There are several mapped springs high on the slopes above these reaches, but their flow is intermittent and goes subsurface. Evidence of annual scour and deposition in the steep hillside channels below the springs was discontinuous or limited. There were 3 perennial tributaries in the upper catchment that were observed during the August survey. Two originated from springs, one mapped (Stroud Springs) and one unmapped. These two tributaries were estimated to contribute as much as 15 percent of the flow when surveyed. The third and uppermost one was the tributary that receives flow from the pipeline, and was noted as contributing nearly all of the flow at its confluence with the main channel.

Table 6. Select Channel Characteristics of the South Fork Mill Creek Subwatershed.

Reach	Channel Type	Confinement	Avg. Gradient (%)	Avg. Bankfull Width (ft.)	Number of Perennial Tributaries, Springs, or Seeps	Dominant Substrate	Total Pools	Primary Pools
1	pool-riffle	very confined	4	23.2	1	coarse gravel	23	4
2	pool-riffle	confined	3	9.7	1	sand and coarse gravel	27	2
3	pool-riffle	confined	6	3.0	1	medium and coarse gravel	0	0

Source: MHNF 2011

Reach 1 is a pool-riffle channel type, and Reaches 2 and 3 are primarily pool-riffle channel types, although Reach 3 also resembled a somewhat step-pool type. Pools were not abundant in any of the reaches, and wholly lacking in Reach 3. The abundance of primary pools was very low throughout all the reaches, and the average residual pool depth in Reach 1 and 2 was 1.7 and 1.4 feet respectively. Overall, in-channel pool abundance was well below standards used for indicating naturally functioning channel forming processes. Wood created the majority of the pools. Entrenchment ratios decreased measurably between the survey in 1999 and 2011, indicating that some incision has occurred (MHNF 1999, 2011).

Owing to the altered flow regime in the South Fork of Mill Creek as a result of the pipeline and reservoir operations, and the management of the municipal water supply, the channel forming processes that factor into pool creation have been altered. The supplemental streamflow from the pipeline has likely increased channel and stream bank scour in Reach 2, potentially increasing the channel gradient (MHNF 1999). Similarly, spillway releases after reservoir fill is achieved along with the heavy drawdown during summer peak use, has altered the flow regime of South Fork Mill Creek below Crow Creek dam. Channel forming processes such as bedload movement and scour no longer favor the formation and development of pools.

Data from the 2011 stream survey of South Fork Mill Creek indicated that the overall abundance and density of large woody debris in all reaches was low. The stream survey found that the majority of woody debris in the system is small and the density of LWD in all reaches was below LRMP or NMFS standards for woody debris density (Table 7).

Table 7. Existing Number of In-channel Woody Debris and Woody Debris Density (total of both medium and large size classes) observed in the 2011 South Fork Mill Creek stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	77	17	3	97	5.8	1.0	6.8	106	20
2	134	37	32	203	8.7	7.5	16.2	106	20
3	10	2	1	13	5.4	2.7	8.1	106	20

Source: MHNF 2011

Most of the woody debris observed was in jams (Table 8). Reach 1 had 32 debris jams, all of which was small sized wood. Reach 2 had 90 jams, 97 percent was small sized wood. In Reach 3 there were 7 debris jams counted, all of which were also small sized wood. All of the debris jams observed are thought to have formed after stream clean-out practices were mostly halted in the early 1980s. Prior to that, stream clean-out practices that removed woody debris from the channel are likely to have contributed to the low abundance observed during the stream survey.

Table 8. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	32	45	32	17	0	3	0
2	90	47	87	34	3	32	0
3	7	3	7	2	0	1	0

Source: MHNF 2011

Since the 2011 survey, there have been additional inputs of in-stream woody debris. Large woody debris recruitment along all the reaches of the Upper catchment are good to excellent in the inner riparian zones. There is also an abundance of downed wood within the inner and outer riparian zones that was not inventoried for the stream survey. Overall, it is believed that the abundance of woody debris throughout the system is mostly sufficient to provide structure and function, and that it continues to naturally accumulate unabated like it has for many decades.

In the Lower catchment, potential recruitment is good along the main corridor of South Fork Mill Creek, but fair to poor in the outer riparian zones where the 1967 School Marm fire and the 2013 Government Flats fire burned over the forest. Further down, the vegetation type changes to more scrub-oak and the main riparian corridor is comprised of willows and cottonwood.

Data from the stream survey indicated that very coarse gravel was the dominant substrate size in Reach 1. The amount of fine sediment that was sampled was considered to be low, possibly as a result of Crow Creek Reservoir capturing and retaining it. In Reach 2, substrate was dominated by coarse gravel and small cobbles, but a notable amount of sand was collected in samples. In Reach 3 medium gravel was the dominant size and type of substrate. Overall, the amount of fine sediment detected was low.

There are 5 road crossings in the subwatershed over perennial streams, of which four are on Federal lands. One is the road segment that crosses across the top of Crow Creek dam. The second and third ones are where FS road 1721 crosses over the South Fork Mill and Alder Creeks. The fourth is a bridge where FS road 1720-190 crosses the South Fork Mill Creek about ¾ mile below the dam. The fifth crossing is a low-water ford downstream from the dam about 3.5 miles on non-Federal land. Because the watershed is closed to the public, none of these crossings are used very often.

Crow Creek was the major perennial tributary to the South Fork of Mill Creek. It no longer ties directly into the South Fork of Mill, but instead flows directly into Crow Creek reservoir, which flooded their confluence after the dam was constructed. Alder Creek is the main contributing perennial channel to Crow Creek. Neither has been formally surveyed intensively. Channel types are considered to be dominantly pool-rifle sequences that are confined and exhibit moderate to steep gradients. Both are considered to be small channels, but the total stream length in their contributing area is estimated to be about 20 miles, of which about half is deemed to be perennial in most years. There are several mapped and unmapped springs that contribute flow. One is Shellrock Springs that feeds into Crow Creek from up near the ridgetop, the other feeds into Alder Creek near its headwaters up on Mill Creek Buttes.

3.3.1.2 Water Quantity and Streamflow

Dog River

Hydrologic data for Dog River is limited. While there is a fair amount of streamflow data at the City's pipeline diversion at RM 6.0, there are very few records of flow data at the mouth. This implies that the effects that have been occurring to the amount of flow in the lower reaches of Dog River as a result of diversion may not be readily discernible. For this analysis, data that were used to characterize stream flow in upper Dog River were recorded just upstream of the pipeline diversion at RM 6.0 in the years 1960 to 1971 and 2011 to 2019. Data collected at the mouth of Dog River at RM 0.0 are less robust, and include a single year between the fall of 2016 and 2017, several isolated spot measurements, and data collected in the spring and early summer of 2019.

Mean annual natural discharge (no diverted water) of Dog River has been estimated to be about 19.7 cfs. Monthly estimates by OWRD of natural streamflow at the mouth indicate that Dog River is fed by a combination of seasonal snowmelt, groundwater, and precipitation. Winter precipitation and spring snowmelt are likely to generate the greatest average streamflow, while base flows would typically occur in late summer to mid-fall (Table 9).

Table 9. Estimated mean monthly natural streamflow (cfs) of Dog River at the mouth (50% exceedance level).

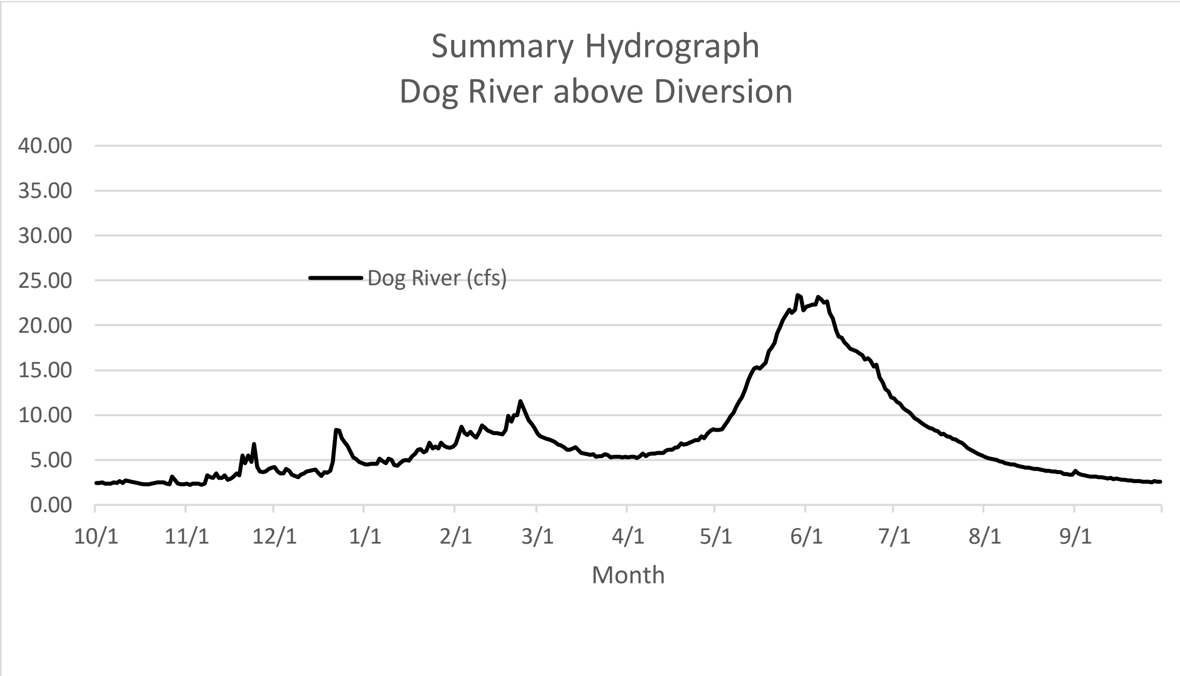
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
27.9	32.5	32.2	33.6	27.0	21.5	12	7.8	5.9	5.5	9.0	21.0

Source: OWRD 2015

According to USGS data from the gage site above the diversion between 1960 and 1971, peak flows are driven by precipitation events or snowmelt, or a combination of both, and have historically occurred between November and June. Average monthly streamflows at the diversion ranged from 2.5 cfs in the fall (October) to 23 cfs in the spring (June). The majority of the summer baseflows are maintained by groundwater from perennial springs and small wet meadows from August through October (Figure 6).

Most of the streamflow volume comes from snowmelt, typically between May and July. Approximately 40 percent of the peak discharge events measured above the diversion occurred in the winter (November through February) and at least three were likely the result of a rain-on-snow episode. Approximately 60 percent of the peak flow records above the diversion occurred in the spring (May through June). Peak daily mean discharge magnitude exceeded 40 cfs during four of the eleven years with a maximum discharge of 72 cfs recorded on May 30th, 1969. These data indicate that Dog River has often undergone two distinct peak flow periods.

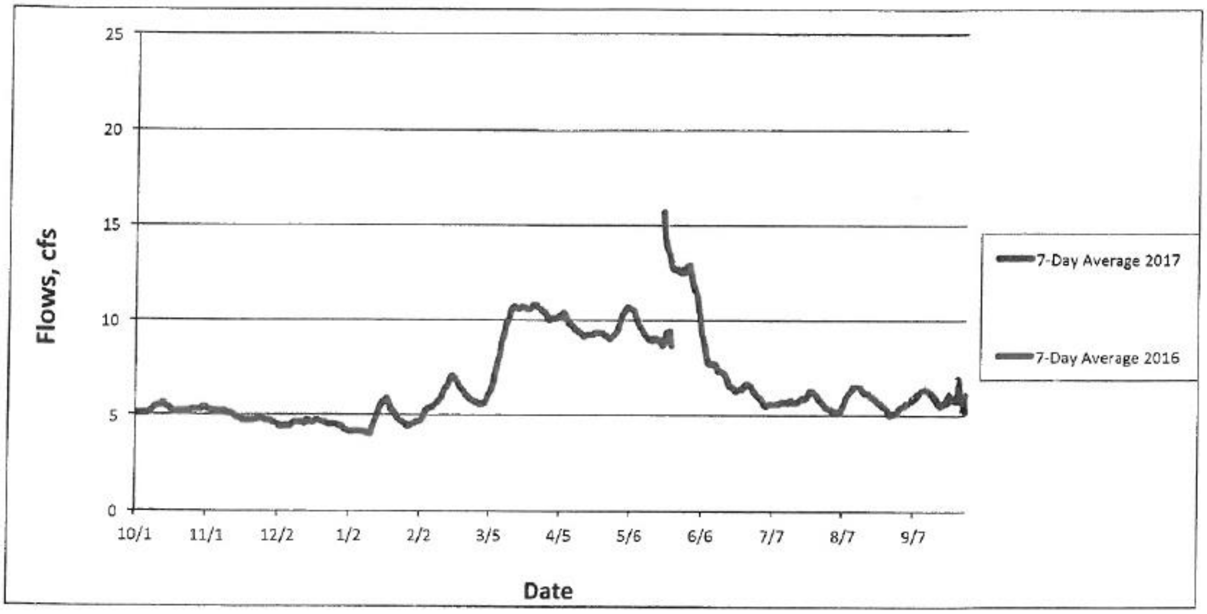
Figure 6. Mean daily discharge (cfs) for Dog River from water years 1961 to 1967 at RM 6.0, upstream of the Dog River pipeline diversion



Source: USGS 2016

Data collected by the CTWS near the mouth of Dog River between the fall of 2016 and fall of 2017 indicate a similar trend occurred for that period (Figure 7). The data show that there was a small peak period in the winter of that year, followed by a notably larger peak flow period in late spring. As would be expected, base flow periods between the two sites was also similar. Although the data collected by CTWS only represents a single year, the hydrograph generated from it suggests that streamflow trends of the Upper and Lower catchments are similar. It is apparent that there is perennial flow at the mouth of Dog River, even in low flow periods when 100 percent of the streamflow is being diverted to the pipeline upstream at RM 6.0.

Figure 7. Mean daily discharge (cfs) for Dog River near RM 0, just upstream of the confluence with East Fork Hood River.



Credit: modified screenshot of graph, CTWS 2017. Note – streamflow in a small side channel at the monitoring site was not fully captured in the data.

The contributing area of the Upper catchment of Dog River, which produces flow available for diversion to the pipeline, comprises 38 percent of the entire subwatershed. Sixty-two percent of the subwatershed is comprised of the Lower catchment, which generates enough of its own flow so that lower Dog River is perennial for nearly its entire length.

When the entire flow of the stream is being diverted to the pipeline in the summer and early fall, the river at the mouth flows perennially. During this low flow period, the only reach that is partially dewatered is an eighth of a mile segment just below the pipeline diversion. Instream flows are restored not far below by springs and hyporheic flow. Despite the diversion of all the summer low flow that is produced from the Upper catchment of Dog River, there has been as much as 40 percent or more gain of available daily flow recorded at the mouth that has been delivered from the Lower catchment (Table 10). But overall, full capture of flows during the summer and late fall above the diversion, has reduced mean monthly base flows at the mouth of Dog River by an estimated 30 to 40 percent.

Table 10. Comparison of Discharge (cfs) in Dog River Measured Above and Below the Diversion on Select Dates.

Location	July 20, 1972	July 27, 2000	July 27, 2016	May 1, 2019
RM 6.0 Above Diversion (fully diverted flow)	6.2[1]	4.0[2]	3.2[3]	14.91[5]
RM 0.0 Near Mouth	NA	8.3[3]	5.3[4]	30.1[5]
RM 3.0 in Reach 2	9.0[1]			

Sources: [1]HRWG 1999, [2]MHF 2000b stream survey, [3]CTD 2017b, [4]CTWS 2017, [5]OWRD 2019

Stream temperature monitoring may serve as a proxy that corroborates data indicating perennial flow in lower Dog River. The MHNF monitored summertime stream temperatures in the lower reach from 1994 through 2002, and again from 2016 through present. In each of these years sufficient flow was available for monitoring stream temperature just upstream from the confluence with East Fork Hood River.

Perennial tributary waters that feed lower Dog River include Puppy Creek, Brooks Meadow Creek, in-channel springs and groundwater, and wet meadows. There are few to no empirical flow data for these sources. There have been several spot flow measurements taken at the mouth of Puppy Creek, including one noted on July 20, 1972 that was 0.1 cfs (HRWG 1999).

Based on estimates derived from the online USGS StreamStats tool (USGS 2017), which can be used for approximating peak and base flow contributions for ungaged streams, Puppy Creek can potentially contribute on average nearly 4 percent of the base flow to lower Dog River. The same tool estimated that Brooks Meadow Creek can potentially contribute nearly 12 percent of the base. Peak flow projections for the two tributaries suggest a reverse trend, and that Puppy Creek can potentially contribute on average about 19 percent of peak flow in lower Dog River, while Brooks Meadow Creek's contribution would only average about 4 percent of the peak. The approximations highlight the seasonality of inputs of each of these catchments to Dog River below the diversion.

Groundwater contributions to Dog River are also believed to be substantial. The proportion of contribution is not known to have been quantified. But there are many mapped springs in the general area, and prominent ones in the Upper catchment that are known to be perennial. There also have been observed quite a few unmapped streamside springs (MHNF 2011).

Of the 33 tributaries observed in the July 2000 stream survey, 27 were near-bank springs or seeps. Seven of them were observed in the Lower Catchment. All 33 of the tributaries observed had enough flow on July 27th to be able to measure their water temperature. These are notable year-round contributions to the water supply of both upper and lower Dog River, and suggest that re-charge of the local aquifer is stored for a period of time before steadily being released as surface flow. In lower Dog River, observers estimated that groundwater contributions amounted to as much as 25 percent of the streamflow when surveyed, and in upper Dog River they concluded that groundwater was the major source of surface flow.

The effects of forest management on water quantity and streamflow in the subwatershed are considered to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2015 to be below thresholds of concern (Table 11). Since then, there has been no new road construction, and only a minor extent of past thinning. Effects of forest management on stream flow are considered to be negligible. There remain however, 5 crossings over perennial streams where segments of road periodically divert intercepted runoff toward streams, a portion of which likely enters the stream during high runoff events. But the amount of contributing area is a very small percentage. Overall, the Dog River subwatershed is considered to be hydrologically recovered from any past long-lasting effects to streamflow from forest management.

Table 11. Road Density and Watershed Impact Areas in the Dog River Subwatershed in 2015.

Indicator	2015	Threshold of Concern
Road Density (mi/sq mi)	2.4	3.0
Watershed Impact Area (%)	2	25

Source: MHNF 2015

It has been estimated that under natural flow conditions, Dog River contributed about 6 percent of the mean annual discharge of the East Fork Hood River (HRWG 1999), above the confluence with Middle Fork Hood River). Since diversion, Dog River is now estimated to contribute approximately 4 percent of the mean annual flow to the East Fork Hood River.

South Fork Mill Creek

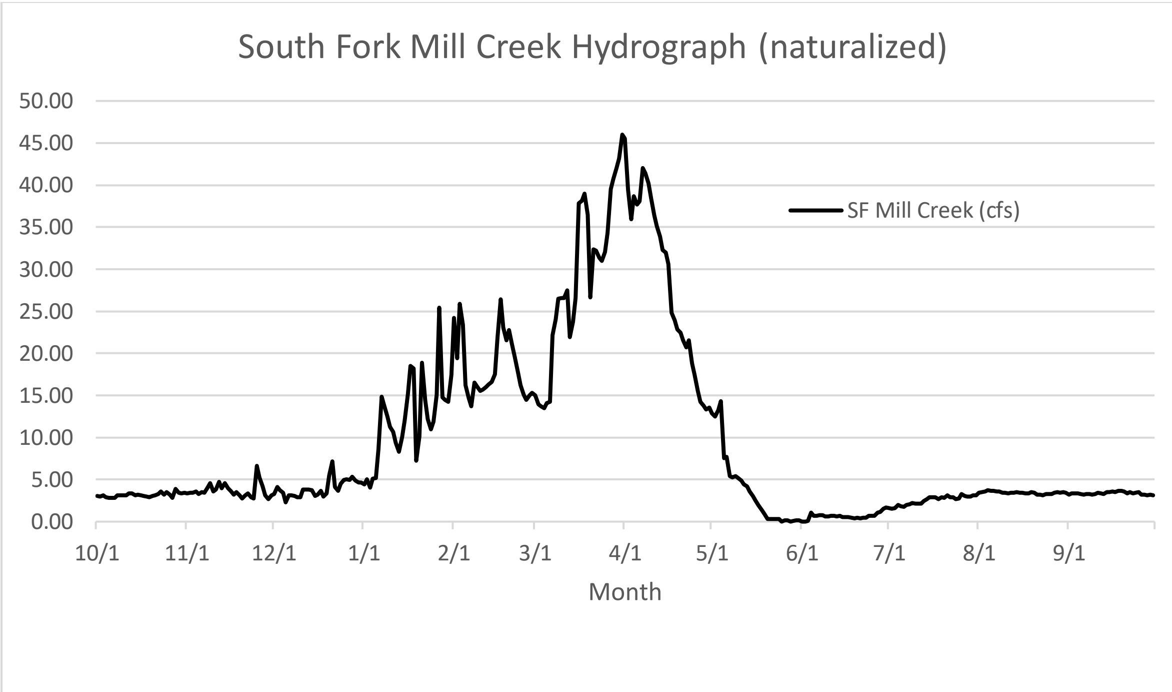
Several data sets are available for characterizing streamflow in the South Fork of Mill Creek. Continuous daily streamflow measurements were collected from October 1960 through September 1975 by the USGS, and from September 2011 to May 2019 by the City of The Dalles at a gage site 0.2 miles upstream from Wicks Reservoir at about RM 1.0 (USGS 2019, CTD 2019). Another set of data was collected between October 1962 and September 1970 from an old gage site at the outlet of the Dog River pipeline where it discharges into a headwater tributary to South Fork Mill (SWCD 2003).

South Fork Mill Creek streamflows are fed primarily by snowmelt, groundwater, and seasonal precipitation. A hydrograph of the natural flow of South Fork Mill was generated by subtracting the flow input from Dog River (Figure 8). This time period is uniquely important because it provides insight into the flow regime of SF Mill Creek prior to the construction of Crow Creek Dam.

Natural mean daily streamflows ranged from 1.3 cfs in June to a little more than 45 cfs in April. The majority of annual streamflow volume for South Fork Mill Creek occurred during March and April. This also is the time when peak flows were most likely to occur due to seasonal snowmelt, although precipitation and rain-on-snow events could lead to peak flows occurring at other times of the year. The highest peak flow recorded was 700 cfs and occurred in 1964, and was a rain-on-snow event. Another rain-on-snow in 1996 is believed to have been greater, but all gaging sites were substantially overtopped so that stage could not be recorded. Base flows were lowest during May to late June, and were probably maintained by the headwater springs high up in the subwatershed. Later, natural base flows rebounded in July and August, presumably as a result of periodic convective thunderstorms.

Compared to the Dog River hydrograph, the majority of the annual peak runoff from South Fork Mill inherently occurred a month sooner. This is likely due to the lower elevation of the South Fork Mill subwatershed, and its position further east of the Cascade crest. Most of the stream flow is generated from the Upper catchment, which comprises 45 percent of the subwatershed and receives the greatest amount of annual precipitation. The Lower catchment generates far less streamflow despite its greater size due to the sharp decline in annual precipitation and elevation eastward. There are no perennial streams in the lower catchment besides South Fork Mill Creek. Nearly all of the perennial flow is produced from the Upper Catchment.

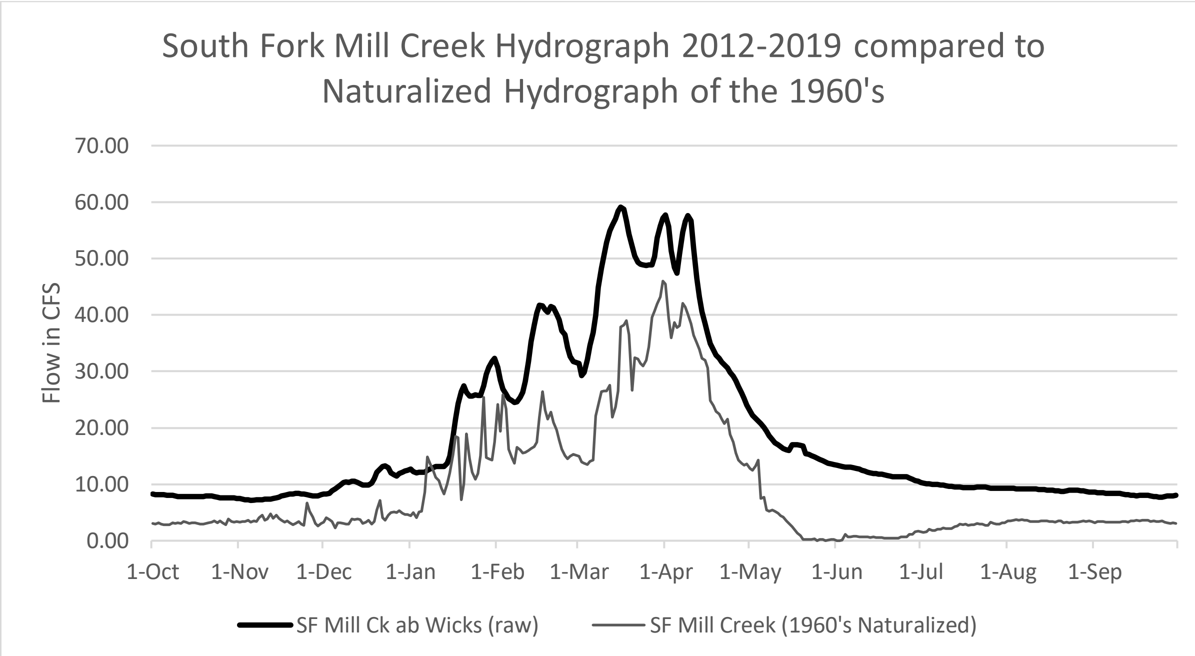
Figure 8. Estimated mean daily discharge (cfs) for South Fork Mill Creek for water years 1960 to 1967 upstream of Wicks Treatment Plant, naturalized by subtracting inputs of diverted water from Dog River.



Source: USGS 2019

Streamflow characteristics changed when the Dog River ditch began diverting water to South Fork Mill Creek in the 1860s, and again after the construction of Crow Creek dam in 1967 (Figure 9). Generally, management of the inflow and storage has resulted in an overall increase in base and mean annual streamflow. Also, the Special Use Permit that the City has with the Forest Service to operate the reservoir stipulates that at least 2 cfs be released below the dam year-around to provide for aesthetics and aquatic organisms (USFS 1967). Streamflow still varies seasonally as it would under natural conditions, but now there is more quantity. For example, a single observation during a stream survey on August 17th, 2011 measured discharge to be 8.6 cfs at the Forest boundary at about RM 8.4 below Crow Creek dam (MHNF 2011). Estimates of natural streamflow for that time of year would be expected to be below 5 cfs.

Figure 9. Hydrograph of South Fork Mill Creek above the Wicks water treatment plant intake.



Source: CTD 2019

Perennial tributaries in the Upper catchment that flow into the South Fork Mill Creek include Crow and Alder Creeks. Based on estimates derived from the online USGS StreamStats tool (USGS 2017), which can be used for approximating peak and base flow contributions for un-gaged streams, Crow Creek can potentially contribute on average about one-third of both the peak and base flow of the South Fork Mill above the reservoir. Estimates for Alder Creek indicate that it could potentially contribute about 40 percent of Crow Creek's peak flow and about 13 percent of its base flow. Together, their contributing area produces a notable perennial supply of streamflow from the Upper catchment that flows into Crow Creek Reservoir.

Several springs located high in the Upper catchment are groundwater sources that contribute perennial streamflow to two unnamed streams. One issues from Stroud spring and is tributary to South Fork Mill Creek, the other originates from Shellrock Springs and is tributary to Crow Creek. There is also a headwater spring that originates in the highest reach of the South Fork Mill Creek, marking the upper limit of its perennial flow. The amount of groundwater supply in the subwatershed has not been quantified, but their year-round contribution to the water supply of the South Fork Mill Creek suggest that they are similar to the many springs in the area, where recharge of the local aquifer is typically stored for a period of time before steadily being released as surface flow.

There have been about 3,829 (21%) acres of forest management activities over the last 15 years on Federal lands in and around the South Fork subwatershed. Treatments consisted of thinning, brushing, pruning, underburning, and pile burning to reduce hazardous fuels. They were intended to minimize the potential risks and impacts of wildfire. Best Management Practices were incorporated into treatment design so that watershed effects would be minimized. Existing effects of forest management on water quantity and streamflow in the subwatershed are considered to be slight.

Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2012 to be below thresholds of concern (Table 12). Since then, there has been no new road construction, some roads have been closed and decommissioned, and the extent of ongoing fuel treatments (i.e. pile burning) is minor. Effects of forest management on stream flow are considered to be negligible.

There remain however, 4 crossings over perennial streams where segments of road periodically divert intercepted runoff toward streams, a portion of which likely enters the stream during high runoff events. But the amount of contributing area is a very small percentage. Overall, the South Fork Mill Creek subwatershed is considered to have minimal hydrologic disturbance from forest management, and any long-lasting effects to streamflow are considered to be negligible.

Table 12. Road Density and Watershed Impact Areas in the South Fork Mill Creek Subwatershed in 2012.

Indicator	2012	Threshold of Concern
Road Density (mi/sq mi)	2.6	3.0
Watershed Impact Area (%)	13*	25

Source: MHNF 2012, MHF 2000b *Prior to the Government Flats fire of 2013.

In 2013, the Government Flats fire burned over about 65 percent of the Lower catchment, the majority on non-federal lands. As a result, there was a reduction in the extent of connected forested canopy, which increased the percentage of watershed impact area in the lower subwatershed. There are no perennial tributaries to South Fork Mill Creek in this burned over area; therefore, increases to runoff would only have been realized following a precipitation or runoff event of sufficient magnitude to produce streamflow in intermittent streams and ephemeral draws. But for the first several years, there was likely an increase in peak flows after periodic heavy precipitation or runoff.

Immediately following the fire, actions were taken to re-establish vegetation by emergency aerial seeding on much of the non-federal acreage. Then, years of natural revegetation and manual reforestation followed and continued to establish. Now, an effective ground cover has mostly recovered. This, and the fact that the burned over area was mostly below the snow zone, in a band of lower annual precipitation, and partially where oak is the dominant vegetation type, peak flow trends are believed to have returned to a pre-fire flow regime and no longer elevated.

It has been estimated that under natural flow conditions, South Fork Mill Creek contributed about 69 percent of the mean annual discharge of Mill Creek (OWRD 2019a). Since diversion for the Wicks water treatment plant, the estimated contribution is approximately 40 percent of Mill Creek's mean annual flow (at 50% exceedance probability).

Dog River Diversion and Crow Creek Reservoir

Nearly 100 percent of the consumptive water use allocated for Dog River and South Fork Mill Creek is for municipal uses by the City of the Dalles (OWRD 2019a). Water is managed for this purpose by using the Dog River diversion and pipeline, and the Crow Creek reservoir facilities. Operations of the Dog River pipeline and Crow Creek reservoir can be generalized as capturing both naturalized streamflow from upper South Fork Mill Creek and the diverted flow from upper Dog River. Maximum storage (full-pool) in the reservoir is usually achieved by early- to mid-February. Once full, diversion of flow from upper Dog River is reduced so as to minimize spill out of the reservoir while maintaining its level at full-pool. Water operations are commonly adjusted throughout the year to try and balance the capture of natural available flow with the quantity of diversion needed to maximize storage, minimize spill, and manage release so that demand is met efficiently. Efficiently managing capture and release is also intended to avoid over-drafting of the reservoir, so that re-filling it during the winter for the following year would be attainable.

The Dog River diversion headworks at RM 6.0 consists of a channel-spanning concrete control structure and spillway, along with a screw gate oriented perpendicular to the direction of flow into the pipeline inlet. The screw gate, which is manually operated, determines the size of the opening for streamflow to enter the pipeline. Water is transferred from Dog River 3.4 miles through the pipeline at a grade of about 1 percent until it discharges into a headwater tributary that flows into the South Fork of Mill Creek at RM 15.7. The outflow then flows downstream for approximately another 5 miles where it enters Crow Creek reservoir.

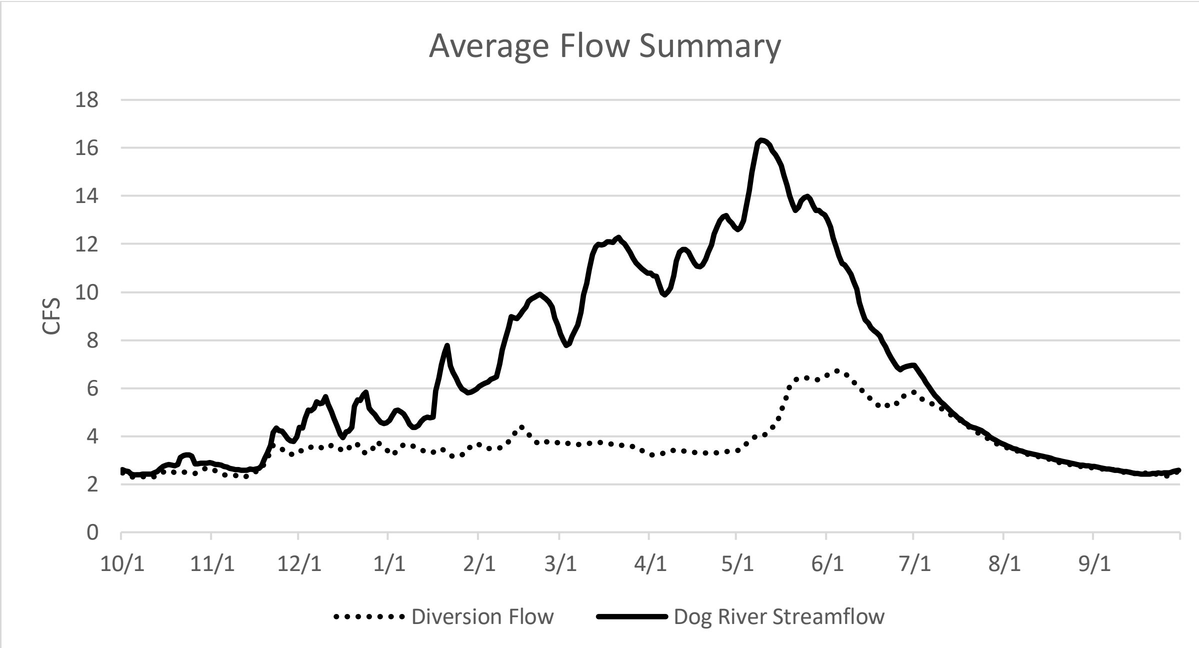
Crow Creek reservoir is supplied by two inlet streams, South Fork Mill Creek and Crow Creek, and their contributing area. The reservoir is a 28-acre earthen structure impoundment. At a pool elevation of nearly 2,600 feet, it has a maximum depth of 65 feet and a storage capacity of about 267 million gallons (~820 AF, MHF 2000b, Mill Ck WA).

A spillway around the north side of the dam overtops when the pool level rises above 2,564.5 feet elevation. There are no controls for the spillway, and no operational capability to manage its height. When water levels rise above its inlet, it simply diverts the flow gravitationally around the dam through an excavated channel and back into an intermittent tributary to the South Fork Mill Creek about 1,200 feet downstream.

Outflow (release) from the base of the dam is controlled manually using a screw valve that is activated from the top of the dam. It provides the operational capability to manage the rate of drawdown and release from the reservoir that discharges as outflow into the South Fork of Mill Creek, eventually to flow approximately 8 miles downstream to the diversion for the Wicks water treatment plant at about RM 1.0.

The timing and amount of diverted flow from upper Dog River is based generally on the City's demand, storage capacity, and abundance or scarcity of supply. On average, Dog River contributes about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer averages about 7.0 cfs, and about 2.5 cfs during late summer. In most years, the headworks at the pipeline inlet are operated to increase diverted flow in the late fall and early winter to re-fill Crow Creek reservoir, by early or mid-February if possible. Once full, the amount of diversion is manually reduced to a maintenance flow of about 2-3 cfs until mid- to late-May (Figure 10). Then the rate of diversion is increased to capture the entire amount of upper Dog River's baseflow from July through September and early October (see Table 13).

Figure 10. Mean daily discharge (cfs) summary of an average water year that is diverted into the City of The Dalles pipeline during 2012 through 2018 compared to the mean daily discharge of Dog River above the diversion.



Source: CTD 2018

Table 13. Estimated Percent of Mean daily discharge (cfs) of Dog River Diverted May through October.

	May	June	July	August	September	October
Percent of Dog River diverted	52	99	100	100	100	99

Source: CTD 2018

The Dog River pipeline at capacity can potentially transfer a maximum flow of 12.3 cfs. Log records from the City of The Dalles indicate that since 2006, there were two occasions when the pipeline was filled to capacity in the period between October and January, and two other times during the month of May (pers. comm. Dave Anderson 2016).

- Jan 30, 2006: pipeline flow of 12.3 cfs for short duration (storm event, flow decreased from 12.3 to 2.5 cfs in less than 24 hours, and had only been flowing at 5.7 cfs on 12/29/2005),
- Dec 24, 2014: pipeline flow of 12.3 cfs for less than 1 week, re-filling Crow Creek reservoir
- May 2009 and 2010 pipeline flow of 12.3 cfs for about 1 week each to finish re-filling Crow Creek reservoir

The pipeline has had many leaks along its length throughout its 100 plus years of use. Currently the only quantification of water loss from the pipeline is a mathematical estimate based upon the volume of the pipe at full capacity. It is estimated by the City that as much as 1.9 cfs may be leaking from the pipeline when it is at full capacity. However, as has been noted prior, there have only been four instances since

2006 when the Dog River pipeline was filled to maximum capacity, and the amount of estimated water loss could have been that much.

Many repairs and patches to limit the leaks have been made over the years with a variety of methods and assorted materials. The locations and severity of leaks have also varied. Moreover, a given leak may only be present or visible during periods of elevated flow within the pipeline, when the range of pressure and velocity are near their highest. At lower flows some leaks may not be detectable, or become a slight trickle. Although leaks of varying size have been observed over the pipeline's lifespan at different times and locations along its length, no comprehensive empirical data have been collected to reliably inventory and characterize the quantity and flow paths of specific leaks.

In recent years there have been several endeavors to try and better understand and characterize the amount of water loss from leaks, but they have not been entirely conclusive. Using instrumentation to measure and track inflow and outflow proved infeasible. The City performed a single dye test in early October of 2016 in an attempt to find evidence that would indicate if leakage from the pipeline was contributing any detectable return flows to lower Dog River during critical low flow periods. The test did not uncover evidence of immediate and detectable return flow (pers. Comm. Dave Anderson 2016a).

During the 2000 summer stream survey, there were not any seeps or springs observed that flowed into lower Dog River from the right streambank (looking downstream) that would suggest that leaks were independently contributing directly to surface flow. All of the near-bank seeps and springs that were inventoried were on the left bank, on the west side of the stream.

Anecdotal observations in late summer of 2017 and again in mid-spring of 2019 provided some insight as to how a leak may behave under different flow rates, and potential fate pathways. It was observed that larger leaks tended to create overland routes during temporary high flow, that then find their way to an existing intermittent or perennial channel. One such leak observed in mid-spring created an overland flow route a short distance to Brooks Meadow Creek. Late summer observations indicated that a couple of larger leaks became trickles and were slowly infiltrating into the soil.

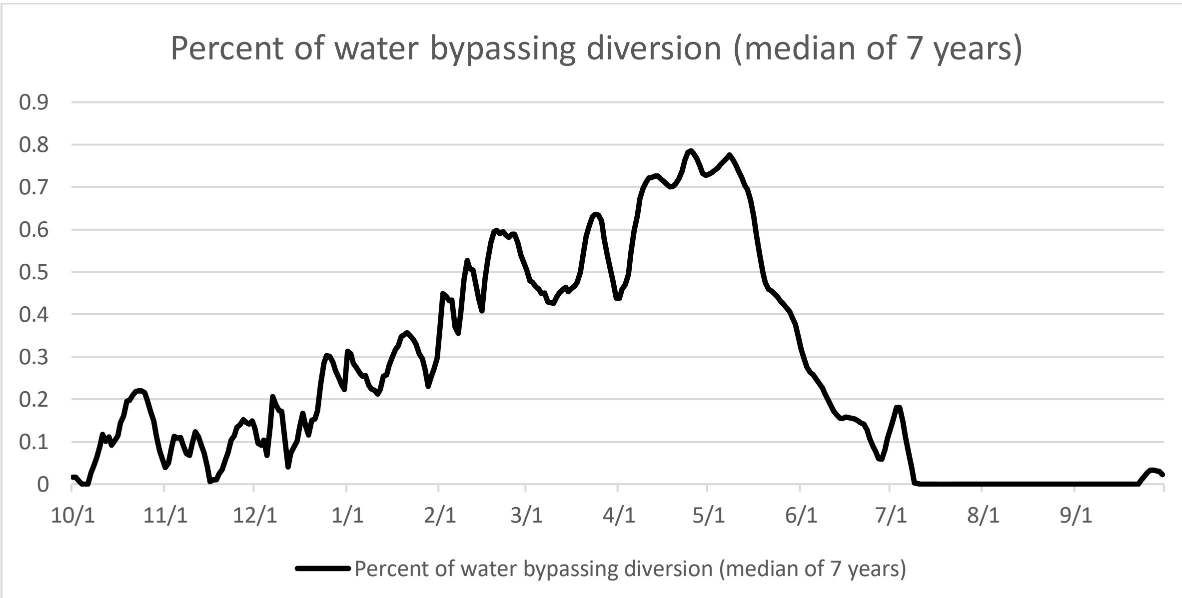
The amount and fate of pipeline leakage is not well known. There is likely a proportion of leakage that cannot be accounted for. A proportion of it is likely returned slowly to the local aquifers in the area to be stored and released steadily over time. During high flows, the larger leaks find overland flow paths to intermittent or perennial streams. Depending on the location of the leak some could return to Dog River, while some could contribute to the South Fork of Mill Creek. Some water loss is likely depleted by evapotranspiration, and some is probably stored in the soil profile. Given the geology of the area, there could be a proportion that drains to deeper aquifers for long-term storage and release elsewhere.

In practice, the total amount of water loss from leakage factors into the amount of water withdrawn from upper Dog River for municipal use. Loss from leakage decreases efficiency of use so that water is withdrawn until the operational demand is met. In effect the amount withdrawn is the quantity needed to meet demand plus leakage. This is one of the reasons the City is proposing to replace their pipeline, as a measure to reduce diversion needed to replace loss.

Water that is not diverted into the pipeline is considered bypass flow and contributes to the available flow downstream into lower Dog River. Usually only a portion of streamflow is diverted from upper Dog River from November to June. During some months bypass flows may be greater than diverted flows. Data show that the City of The Dalles diverts the maximum percentage of streamflow through the pipeline during the summer and early fall; bypass flows are often zero in July through September.

Since there is natural variability in the amount of streamflow available in Dog River, evaluating bypass flows as a percentage of the total available flow can help explain how much volume from the Upper catchment passes downstream to lower Dog River. Figure 11 displays the percentage of total streamflow that was not diverted, but rather flowed past the point of diversion and stayed in the main channel of Dog River during the 2012 to 2018 period of record. The maximum amount of bypass flow can be expected to occur during late April and early May and has accounted for between 70 and 80 percent of the total available flow from upper Dog River.

Figure 11. The amount of mean daily streamflow that bypassed the pipeline diversion down Dog River (undiverted flow), expressed as a percentage of total available streamflow for water years 2012 to 2018.



Source: MHNF 2018

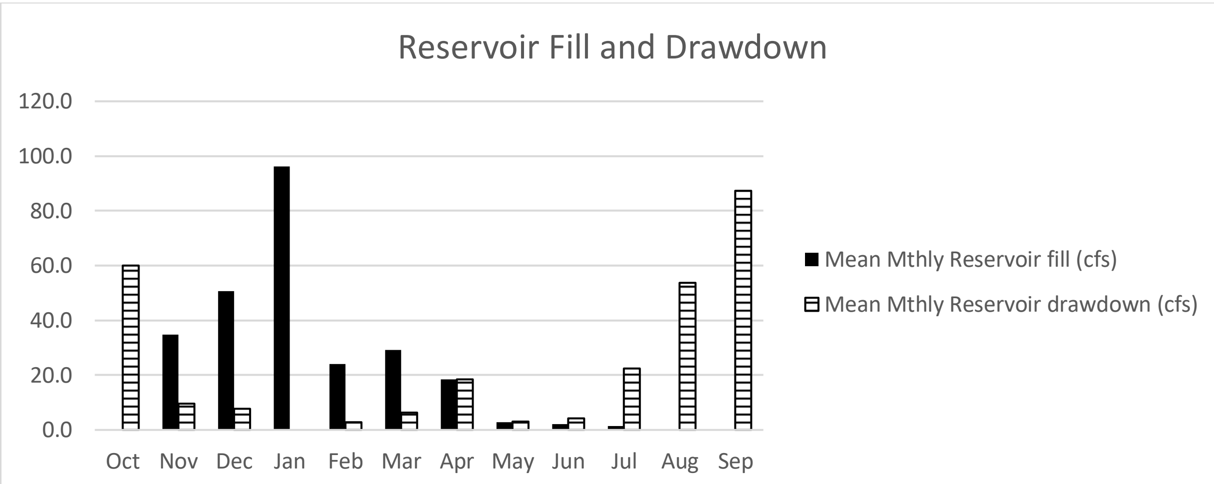
Streamflow data are not available for the portion of South Fork Mill Creek above Crow Creek Reservoir. Dam release and spillway flows associated with Crow Creek reservoir were provided by the City of The Dalles from 2006 to 2015 (Table 14). These data provide insight into the management of Crow Creek Reservoir, and can be used in conjunction with available diversion data, to estimate "naturalized" reservoir inflow. The naturalized reservoir inflow represents the combined flow from Crow Creek, Alder Creek, and South Fork Mill Creek, not including the water delivered through the Dog River diversion. The highest naturalized inflow between 2006 and 2015 was nearly 100 cfs, recorded on March 31st, 2011 (note: data are typically recorded once per week so some peak flows may have been missed).

Table 14. Estimated maximum naturalized inflow into Crow Creek Reservoir not including diverted flows from Dog River.

Maximum Naturalized Inflow to Crow Creek Reservoir (cfs)									
2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
78.4	10.5	12.8	29.3	5.0	98.4	80.5	20.1	21.9	9.5
3-Feb	22-May	27-Jun	20-May	28-Apr	31-Mar	26-Apr	21-Mar	21-Feb	6-Jan

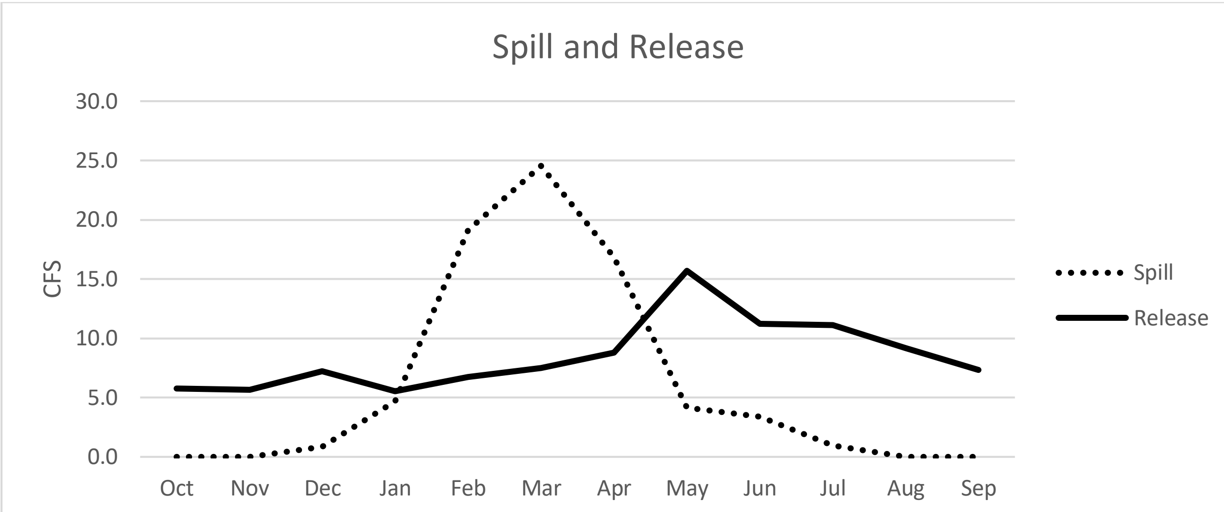
Release from the reservoir occurs year-round primarily for: 1) treatment to meet municipal demand, and 2) to provide at least 2.0 cfs to South Fork Mill Creek as stipulated by the reservoir Special Use Permit. Dam releases are commonly 6 cfs or higher. Releases that are 6 cfs or higher would be generated naturally by South Fork Mill Creek approximately 50% of the time (USGS 2017). The quantity needed for release typically fluctuates on a seasonal trend, but may also occur weekly or daily. The greatest demand and drawdown usually occurs during the summer months when precipitation is low and air temperature is high. As inflow into the reservoir begins to subside, drawdown begins to occur and the water level of the reservoir drops. The City normally begins drawdown in early July and it is often November before any refilling begins (Figure 12). Reliable late summer flows from these surface water sources, including available live flows and stored water releases, are currently estimated to be 5.4 cfs (CTD 2014). Sometimes there are needs for special releases such as when one of the supplemental wells is taken off-line.

Figure 12. Mean monthly fill and drawdown trends during the period 2005 to 2015.



When the level of the water in the reservoir is higher than the elevation of the spillway inlet, it will flow out the spillway channel. Spill is greatest during the winter and spring, and usually occurs in response to heavy precipitation or runoff (Figure 13). Spill can be greater than release during these occurrences, and excess to municipal use. This flow is bypass to the intake at the Wicks water treatment plant, and contributes to Mill Creek discharge. Spill typically does not occur during the early summer to late fall months, when demand and drawdown are highest. If spill is occurring, then less is needed for release.

Figure 13. Comparison of mean monthly spill and release during the period 2005 to 2015.



Source: CTD 2017c. Note: Spill is not recorded continuously, so missing data has been interpreted by the graphed line.

Besides Crow Creek reservoir, the City has 5 additional drinking water storage facilities in town. They store finished drinking water for the community. The use of surface water from South Fork Mill Creek is supplemented by three City groundwater wells, which are used to augment and bolster total municipal supply, typically during peak demand in the summer months, or for emergencies. In the year 2012, approximately 87 percent of municipal water supply came from the City's surface water sources and 13 percent came from groundwater (CTD 2014).

The Wicks water treatment plant intake from South Fork Mill Creek diverts on averages about 5.0 cfs annually, but it has a maximum capacity to treat up to about 8.7 cfs. The City's average annual water use was estimated in 2015 to be 4.7 cfs. Estimated average use per month ranged from 2.6 cfs in October to 8.5 cfs in June (BOR 2015). The City's Water Master Plan of 2006 describes their municipal water system, its operations, maintenance, projected needs, customer base, budget, etc.

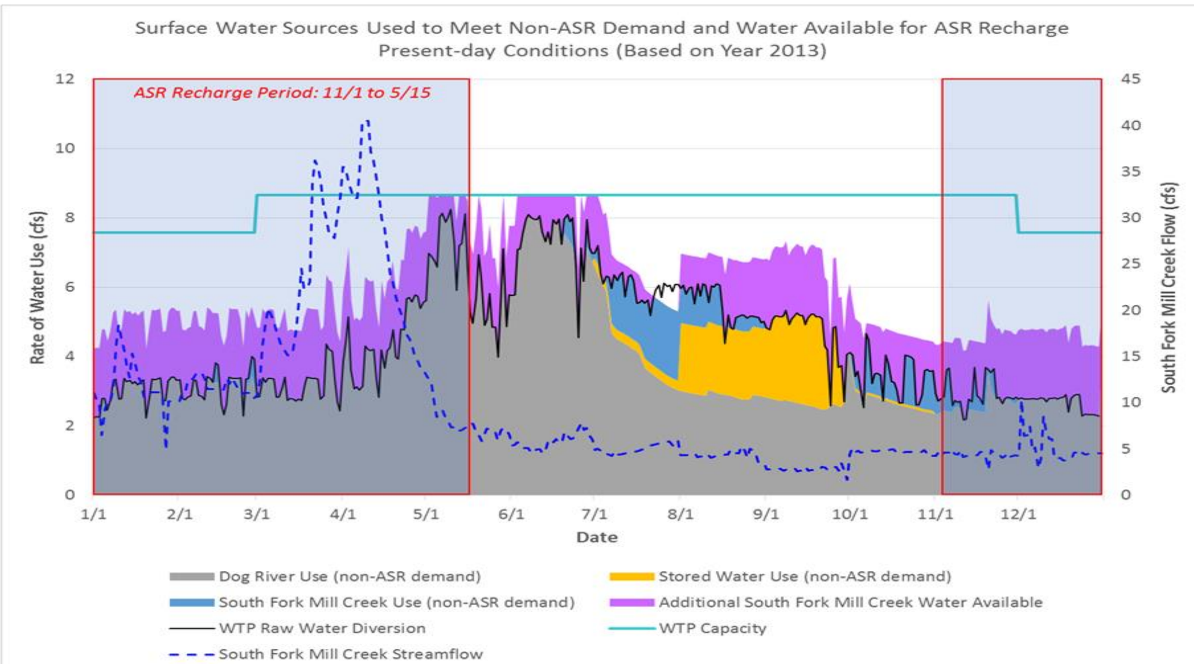
The City also prepared a Water Management and Conservation Plan in 2014 that was required by OWRD as a condition of their surface water rights. In that plan are projections for future growth and demand, and plans for meeting them. It includes conservation measures to be implemented to improve efficiency of water use and minimize losses.

Future projects addressed by the City's 2006 Water System Master Plan include expansions of Crow Creek Reservoir on Forest Service lands and the Wicks water treatment plant downstream, which are anticipated to increase the reliable summer flows from the municipal watershed to 15.5 cfs, for a total increase of 6.8 cfs. To date, however, only preliminary plans have been drafted, and there has not been any formal proposal submitted to the Forest Service from the City to proceed with the expansion of the reservoir. More recently, the City has received a limited license from OWRD to explore the feasibility of an Aquifer Storage and Recovery (ASR) system on their property. The permit allows for 16.7 cfs to be used for exploration of the ASR, using water from the Wicks treatment plant. If feasibility is proven, then it is possible that the City would not need to pursue expanding Crow Creek Reservoir (pers. Comm. Dave Anderson 2019).

Testing for ASR would not be reliant on replacement of the Dog River pipeline, and will begin whether or not the Proposed Action proceeds. Water to be used for the ASR testing would be supplied by the surface water rights in the municipal watershed, which include Dog River, South Fork Mill Creek, and Crow Creek reservoir as stipulated by the limited license. The water treatment plant's average intake would be expected to increase too, capitalizing on existing flow that has not been utilized for municipal use prior. In the issuance of the City's limited license, OWRD has estimated that existing surface flow and storage is available for the City's ASR project (OWRD 2018).

It is estimated that demand for ASR testing will be 244 million gallons per year (equates approximately to 1.03 cfs). The increase in demand to test the ASR is expected to be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average available spill and runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would not be a need for additional water diverted from Dog River to meet the increase in demand (Figure 14).

Figure 14. Comparison of the proportion of the different source water supply with current and projected ASR demand.



Source: CTD 2019a Note: different scale for S. Fk. Mill Creek on right-hand axis). Values above the solid black line (i.e., WTP Raw Water Diversion) represent the volume of unused water currently available for ASR testing.

3.3.1.3 Water Quality

Dog River

The Oregon Department of Environmental Quality (ODEQ) designates beneficial uses for river basins in the state for which water quality standards are established. Beneficial uses designated by ODEQ for the Hood Basin, which the waters of Dog River contribute to, are numerous (Table 15). The beneficial uses designated for Dog River are fish and aquatic life and public domestic water supply. In the lower catchment of the Dog River subwatershed, from the mouth up to about RM 5.5 the use is specifically designated for trout and salmon habitat, and salmon and steelhead spawning between October 15 and May 15. In the upper catchment above RM 5.5 the designated beneficial use is specifically for the Dalles Municipal Watershed and as core cold water habitat.

Table 15. Beneficial Use Designations for the Hood Basin (includes Mill Creek) from ODEQ.

Beneficial Use	**Hood River Basin Streams**
Public domestic water supply*	X
Private domestic water supply*	X
Industrial water supply	X
Irrigation	X
Livestock watering	X
Fish and aquatic life	X
Wildlife and hunting	X
Fishing	X
Boating	X
Water contact recreation	X
Aesthetic quality	X
Hydropower	X
Commercial navigation and transportation	X

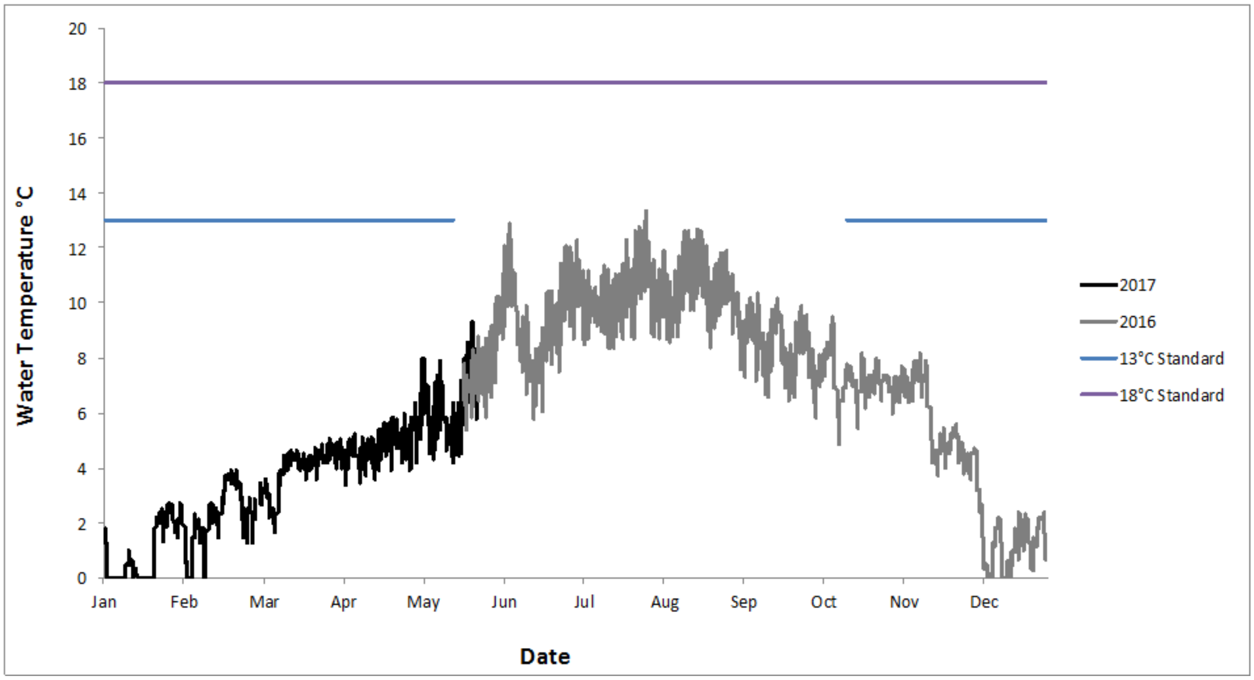
* With adequate pre-treatment (filtration and disinfection) and natural quality to meet drinking water standards.
Source: Table adapted from ODEQ (ODEQ 2017b)

For the designated Dog River beneficial uses, only one water quality standard has been identified as impaired, and is included on the ODEQ's 303(d) list of Category 5 waters in their 2012 Integrated Report. Testing of water samples taken from Dog River detected that the amount of iron in the water exceeds the standard for that constituent. It is considered to be a non-point source contaminant because the cause for its presence and the amounts detected are not known. In fact, iron is listed as a constituent of impairment in the entire Hood River basin including the West Fork, Middle Fork, and East Fork. It has been surmised that iron may be naturally occurring, and its presence could be due to the geologic formations that underlie the area (ODEQ 2017c). No other impairments are listed by ODEQ for Dog River; no other point source or non-point source pollutants, contaminants, or water quality exceedances have been identified.

Due to the presence and use by salmon and steelhead of the lowest 2.5 miles of Dog River, and because of the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature has been an ongoing effort by the MHNF. Temperature data collected above the pipeline diversion indicated that temperatures within upper Dog River are cold and vary seasonally from close to 0°C in the winter (December to February) to approximately 13°C in late July (MHNF 1996, 2017). At the mouth of Dog River, temperature monitoring between July and October of 2000 (MHNF 2000a) found that the 7-day maximum temperature remained below 13°C, which is the ODFW standard for salmon and steelhead spawning, during that time period (Figure 15).

A June 2017 technical memorandum from the CTWS described Dog River as potential cold-water thermal refuge for salmon species in the East Fork Hood River because of the groundwater inputs from springs and wet meadows (CTWS 2017). Results from their stream temperature monitoring near the mouth between May 2016 and May 2017 are displayed in Figure 15. That data corroborates the 7-day maximum temperature findings of the MHNF, and verifies further the cold water contribution of Dog River to the East Fork Hood River, particularly during inherent low flow periods in late summer and early fall.

Figure 15. Daily average temperature data for Dog River upstream of the confluence of the East Fork Hood River.



Source: CTWS 2017

Stream temperature monitoring was also conducted by the MHNF in Puppy Creek near its mouth during a 2001 stream survey. The seven-day maximum average temperature did not exceed 14.5°C, indicating its contribution of cold water to lower Dog River at RM 0.1. Further upstream at about RM 5.4, the inflow of Brooks Meadow Creek is also thought to be a source of cold water. While long-term stream temperature monitoring has not been conducted there, its high elevation (approximately 4,500 feet), groundwater source, short stream length, effective shading, and moderate late-summer flow (estim. avg. 2 cfs) suggests it is likely another cold water source to Dog River (MHNF 2017). Dog River has been identified as a cold water source for the East Fork Hood River. It is known to contribute cold water in the summer, including when full diversion into the pipeline occurs upstream at RM 6.0.

Residual effects to riparian shading from past forest management are considered to be negligible in the Dog River subwatershed. The solar radiation measurements taken during the 2000 stream survey averaged overall about 32 percent, indicating that the majority of the length of Dog River had effective shade. Segments of reaches where shade was lacking included two older clearcut plantations along approximately 0.4 miles of lower Dog River where riparian vegetation had been encroached upon during the original harvest in the 1970s, and where several small patches of streamside blowdown occur in both the lower and upper reaches.

As indicated by the 2000 stream survey conducted by the MHNF, fine sediment does not appear to have been impacting the water quality of Dog River. Also, the ODEQ 303(d) list does not identify any impairments for Dog River for turbidity or sediment. There are however, anthropogenic sources of fine sediment in the subwatershed. The principle sources are where certain segments of road connect to the channel network at specific perennial stream crossings. There are four perennial stream crossings where the potential for fine sediment to enter the stream network is greatest.

The first is where Highway 35 crosses over Dog River at RM 0.1. Highway 35 is a major thoroughfare, and is subject to year-round traffic that at times can be heavy, particularly during the winter ski season. Grime and grit from the highway can be washed into streams where it crosses over them. In wintertime driving conditions are often slick, so it is common practice that the highway is sanded to enhance traction. Sanding materials typically buildup along the roadside over the course of the season. Road crews make an effort to recover much of this roadside buildup, but a notable proportion of it cannot be recovered. At stream crossings, such as the one over Dog River near its mouth, these sanding materials remain poised where they can be washed into stream waters periodically when it rains.

Two of the other crossings are where FS road 44 crosses over Dog River and where FS road 17 crosses over Brooks Meadow Creek. Both are paved crossings where use is seasonal, sporadic, and relatively low. The amount of road grit and fine sediment generated at these crossings that can enter stream water is comparatively low.

The fourth crossing is where Brooks Meadow Creek flows across the top of the 12-foot wide gravel service road that parallels the pipeline. The channel at this crossing has been heavily impacted, and flow is sometimes hindered, ponding in wheel ruts before passing across and back into the creek. Although this road is used very little, water flows across it persistently. When not frozen, this site is always ponded and muddy, it is a potential chronic source of fine sediment. But the area is small, and the stream velocity low, so the amount of sediment that actually gets mobilized into the water column is relatively low too, except when a vehicle or OHV occasionally runs through the 10 x 12 foot puddle.

South Fork Mill Creek

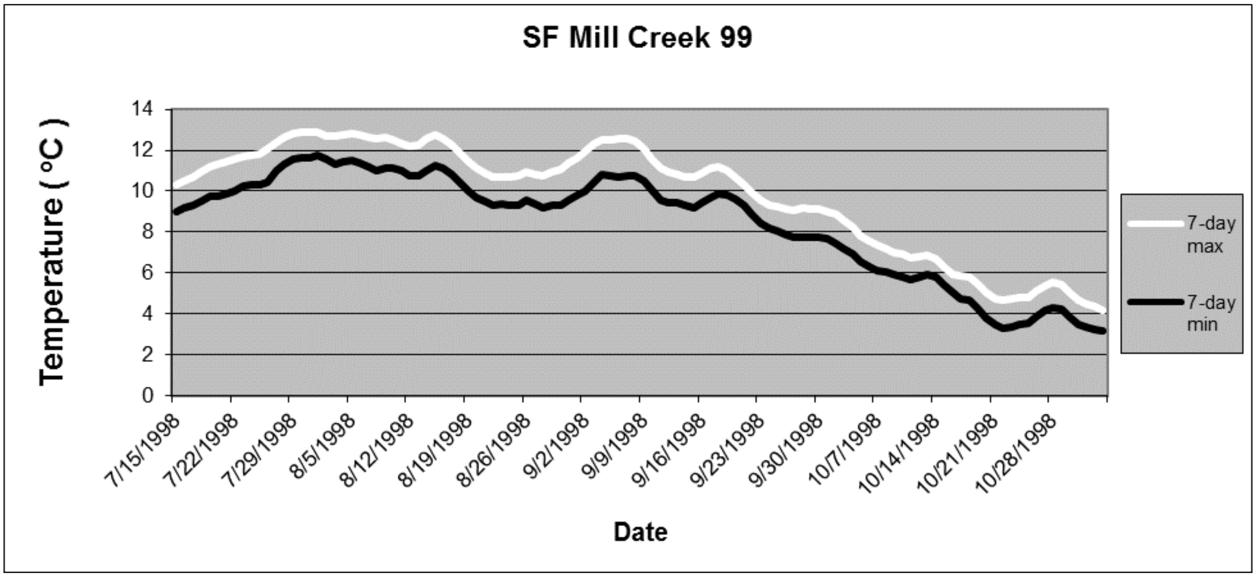
Beneficial uses designated by ODEQ for the Hood Basin, which the waters of South Fork Mill Creek contribute to, are also numerous (Table 15). The beneficial uses designated expressly for South Fork Mill Creek are entirely public domestic water supply, but also for fish and aquatic life below Crow Creek Reservoir. In the lower catchment of the South Fork Mill subwatershed, from the mouth up to Crow Creek Reservoir the designation is specifically for trout and salmon habitat, while only the reach segment between the mouth and the waterfall at about RM 2.5 is designated specifically for salmon and steelhead spawning between October 15 and May 15. In the upper catchment above Crow Creek Reservoir, the designated beneficial use for fish and aquatic life is specifically core cold water habitat.

For the designated beneficial uses for South Fork Mill Creek, there are no water quality standards identified as impaired on the ODEQ's 303(d) list of Category 5 waters in their 2012 Integrated Report. The City of the Dalles performs regular water quality testing on the South Fork Mill Creek just upstream of their municipal water treatment plant. Other than seasonal or storm variation in temperature, turbidity, pH, and hardness, their monitoring indicates that the quality of the stream water in the creek is very good. Occasionally they detect high concentrations of coliform, believed to originate from wildlife fecal contamination. In the past, they have also detected slightly elevated concentrations of phosphorus, possibly from accumulated sediments in the reservoir. However, the dilution provided by the inflow of water from Dog River has abated any effect that could necessitate special treatment (MHNF 2000b).

Due to the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature has been a contributing effort by the MHNF to provide data to ODEQ. Stream temperature data were monitored in South Fork Mill Creek at the USFS boundary between July 9, 1999 and November 3, 1999 (MHNF 1999). The seven-day average maximum water temperatures did not exceed

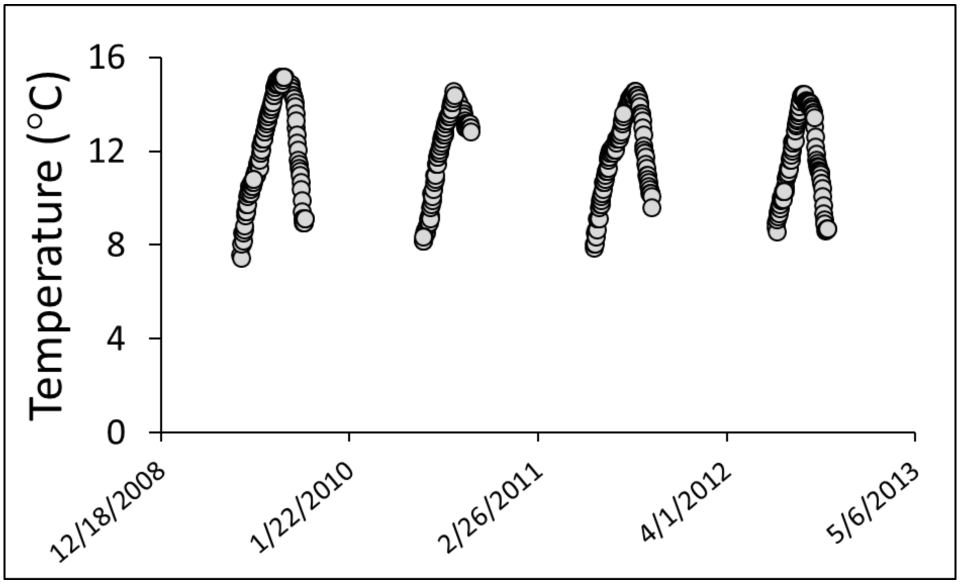
13^{o}C, which is the ODFW standard for salmon and steelhead spawning, during that time (Figure 16). Additional monitoring of summer stream temperatures at a different location just downstream of Crow Creek Reservoir between 2009 and 2012 (Figure 17) indicated that the seven-day maximum temperature commonly increased slightly above the 13^{o}C standard from early August to early October.

Figure 16. Seven-day-minimum and maximum temperatures in South Fork Mill Creek (elevation of 2,000 feet) at the USFS boundary (MHNF 1999) 4 miles below Crow Creek Reservoir.



Explanation for the differences in maximum stream temperatures observed at the two different locations is not readily discernible. The 1999 data were acquired from a site 250 feet lower in elevation and about 4 miles downstream from the other monitoring site. Additional data would be needed to reliably determine the cause for the difference, but one factor that may be at the upper monitoring site is the reservoir. Drawdown during peak use would have lowered reservoir levels, resulting in the potential increase of temperature in the stored water that issued from the dam where the monitoring occurred. Regardless, stream temperature is not considered by ODEQ to be degrading water quality in the South Fork Mill Creek.

Figure 17. Summer average daily temperature for South Fork Mill Creek (elevation of 2,500 feet), just below Crow Creek Reservoir.



Source: MHNF 2017

Residual effects to riparian shading from past forest management are also considered to be negligible in the South Fork Mill Creek subwatershed. Solar radiation measurements taken during the 2011 stream survey averaged overall about 12 percent for the month of July, indicating that the majority of the length of the surveyed reaches had effective shade. Impacts to riparian vegetation from the Government Flats fire in 2013 were not extensive nor long-lasting in the South Fork Mill Creek subwatershed, and regrowth of streamside shade that was affected has mostly recovered.

As indicated by the 2011 stream survey conducted by the MHNF, fine sediment was not observed to be impacting the water quality of South Fork Mill Creek. The ODEQ 303(d) list also does not identify any impairments for South Fork Mill Creek for turbidity or sediment. There are however, some anthropogenic sources of fine sediment in the subwatershed. The primary sources on Forest Service lands are where certain segments of road connect to the channel network at specific perennial stream crossings, and presumably where several segments of the lower reach exhibited some evidence of unstable stream banks.

Three of the crossings are associated with FS road 1721 where it crosses over Stroud Springs and the South Fork of Mill Creek, and also at Alder Creek. The relative amount of sediment potentially delivered from roads to these crossings is considered to be low. First, there is very little traffic because it is within the Municipal Watershed which is closed to public use. Also, all three crossings are upstream of Crow Creek Reservoir, where road sediment would be expected to settle and accumulate. Lastly, the drainage structures on this road are in good condition, and have been purposefully constructed to minimize the length of road connected to the stream network.

A fourth crossing is currently a bridge where FS road 1720-190 crosses the South Fork of Mill Creek about ¾ of a mile below the dam. It has blown out due to storm flow events on several occasions (MHNF 2000b). It is also within the Municipal Watershed, and seldom used. There has not been a great deal of sediment observed from the use of this road, but there probably had been for a short period at the time it was blown out.

Another crossing is a low-water ford about 3.5 miles downstream of the dam on non-Federal land. It is also seldom used, and it is not always passable. Periodically, it could get used during low flow periods when it would be safe to cross over. When crossed by a motorized vehicle, it is likely that a measure of sediment is stirred and mobilized. The duration of the disturbance would be brief, so conceivably the amount of sediment generated would be minor and short-lived.

The 2011 stream survey of South Fork Mill Creek noted some evidence of unstable streambanks in the lower reach not far upstream of the Forest boundary. It is presumed that they have developed as a result of an altered hydrologic regime. During peak demand in late summer and early fall, the streamflow is greater than what it would have been before the dam was constructed. Now it is likely that the creek flows higher, and so stream banks in certain places have undergone some adjustment and periodic erosion.

Sedimentation has likely increased periodically due to wildfires that have occurred in the subwatershed. In 2013, the Government Flats fire burned over about 65 percent of the Lower catchment of the South Fork subwatershed, mostly on non-federal lands. As a result, there was a reduction in the extent of effective ground cover for several years. For the first wet season following the fire, turbidity levels detected by the Wicks water treatment plant were elevated, particularly after periodic rains. Ash had also been detected, and the plant had to modify measures to treat it. Fortunately, there were no large storms of above normal peak intensity that year, so the increased turbidity and ash contaminants remained treatable, and the treatment plant was able to remain online and in operation (pers. comm. Dave Anderson 2014).

Immediately following the fire, actions were taken to reestablish vegetation by emergency aerial seeding on much of the non-federal acreage. Then, years of natural revegetation and manual reforestation followed and continued to establish. Now, an effective ground cover has mostly recovered. This, and the fact that the burned over area was mostly below the snow zone and in a band of lower annual precipitation, sedimentation trends are believed to have returned to a pre-fire regime and no longer elevated.

3.3.1.4 Water Rights

Water rights are under the purview of the Oregon Water Resources Department (OWRD), the state authority that regulates and oversees their use. OWRD monitors the City of the Dalles to ensure compliance with Oregon Water Law that pertains to municipal use. The City of The Dalles reports to OWRD their usage, proposed upgrades or changes, and provides planning documents for review consistent with the requirements of Oregon Revised Statutes (ORS) and Administrative Rules (OAR).

The Mt. Hood National Forest does not administer or enforce water rights. However, the Forest's Special Use Permits, which authorize the City to operate and maintain the Dog River pipeline and Crow Creek Reservoir facilities located on National Forest System lands, require that all permitted activities comply with State laws. The Mt. Hood National Forest relies on the OWRD's oversight of the City's use of its water rights for compliance with the applicable State water laws.

There are four certificated water rights on National Forest System lands in the Dog River and South Fork of Mill Creek subwatersheds that are designated for municipal use (Table 16). They include: 1.) a decreed surface water right that authorizes the use of up to 2 cfs from South Fork Mill Creek; 2.) a decreed surface water right that authorizes the use of all the water in Dog River; 3.) a storage right for 955 acre-feet (AF) of water in Crow Creek Reservoir; and 4.) a secondary right for the use of the stored water in the reservoir.
The City also holds two permitted applications for the storage and use of up to an additional 2,100 AF of water from South Fork Mill Creek, Dog River, and Crow Creek Reservoir.

Table 16. Surface Water Rights in the Dog River and South Fork of Mill Creek subwatersheds that are designated for municipal use by the Oregon Water Resources Department.

City of The Dalles

	Application	Permit	Certificate	Claim, Decree, or Transfer	Priority date	Type of Beneficial Use	Authorized Rate or Annual Volume
Dog River			14954	Hood River decree	8/1/1870	Municipal	"All the water in stream at point of diversion"
South Fork Mill Creek			5691	Mill Creek decree	1862	Municipal	2 cfs
Crow Creek reservoir	S-43668	S-32479	60410		5/29/1967	Municipal	955 AF
Crow Creek Reservoir	S-84050	S-53930	NA		1/21/1999	Municipal	2,100 AF
South Fork Mill Creek, Dog River	R-43667	R-4988	44917		5/29/1967	Storage for Municipal	955 AF
South Fork Mill Creek, Dog River	R-84049	R-13105	NA		1/21/1999	Storage for Municipal	2,100 AF

Source: OWRDb 2019 Note: Definitions: *Permit* – Applicant has been approved to develop a water source for its designated beneficial use. *Certificate* – Applicant has "perfected" and developed the water right as per the conditions of the permit. The water right has become certified to the holder. *Decree* – Court issued water right to a holder.

Both of the certified, decreed municipal water rights that the City holds (cert #s 14954 and 5691) have priority dates that precede all other water rights in the Dog River and South Fork Mill Creek subwatersheds. Based on the principle of prior appropriation of Oregon's water laws, they are senior to all other water rights with later priority dates. Moreover, because they are municipal rights, they are not subject to standard forfeiture statutes for non-use (ORS 540.610), and are protected from future appropriations that would impair the municipal water supply (ORS 538.410).

The City of The Dalles also holds a variety of long-standing groundwater rights. Nine wells provide a total of about 22.3 cfs for municipal uses. All of the points of diversion and use are on City or county lands, and are permitted or certified by the OWRD. There is also a water right permit (S-49653) for withdrawing 40 cfs from the Columbia River, but that has not been developed to date, and it appears unlikely that it will be put into use soon because of the City's uncertainty about its feasibility. None of these sources fall within the purview of the Mt. Hood National Forest because they are not located on National Forest System lands.

The two permitted water rights (S-53930 and R-13105) authorize the City to increase the storage capacity of the Crow Creek Reservoir for municipal use. Both have priority dates from January of 1999. The completion dates of both have been extended to 2021. But to date, the City has not proven up on either permit, and they have yet to proceed with formalizing any plans for expansion. They are expected to file for another extension so that they can maintain the rights, but it is uncertain when, or if they will move forward pending the feasibility of other storage options being explored. If they decide to proceed with storage expansion, then NEPA would have to be initiated because the action would partially be located on National Forest System Lands.

In October of 2018, OWRD issued a final order and limited license approving the City to conduct testing for the feasibility of an Aquifer Storage and Recovery (ASR) system. ASR is the direct injection of surface water supplies into an aquifer for later recovery and use. This license allows the City to divert up to 16.7 cfs using their certificated water rights for Dog River, the South Fork of Mill Creek, and Crow Creek Reservoir for testing ASR. OWRD determined that at this rate, the proposed testing would not impair or be detrimental to the public interest. The license also stipulates that testing would produce information to describe effects of the ASR to the water quality and quantity in the aquifer and nearby wells and springs. The license would not expand the use under an existing water right (OWRD 2018).

There are two other surface water rights in the Dog River and South Fork Mill Creek subwatersheds (Table 17). Both rights are held in-trust by OWRD on behalf of the Oregon Dept. of Fish and Wildlife (ODFW) to provide stream flow for the migration, spawning, egg incubation, fry emergence, and juvenile rearing for Coho salmon, summer and winter steelhead, rainbow trout and cutthroat trout. The priority date for both instream water rights is 1991.

The flow rates allocated to them apply to the reaches of each below the point of diversion for the Dog River pipeline and Crow Creek dam. They do not apply to the reaches upstream of those points of diversion. These rates were determined by OWRD so that any remaining water available for allocation as a water right in the watershed would be designated for the in-stream purpose, and is the remainder of the estimated natural average flow not being used for other senior users. They are not defined in the certificates to be minimum flow requirements. These two water rights do not guarantee actual flow availability at those rates, but rather reflect the maximum allocation protected for the instream beneficial use by the water right. As a condition of the certificate, they do not have priority over human consumption. They are considered by OWRD to be junior to the City of The Dalles municipal water rights in Dog River and South Fork Mill Creek.

Table 17. In-stream surface water rights in the Dog River and South Fork Mill Creek subwatersheds and the maximum monthly allocation protected by OWRD for instream use.

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dog River below diversion Certificate IS76267A	12.0	12.0	12.0	20.0	20.0	20.0	12.0	7.01	6.05	7.79	14.7	12.0
S Fk Mill Creek below dam Certificate IS72078A	7.0	7.0	10.0	17.0	17.0	7.8	4.8	5.4	6.1	4.8	5.5	7.0

Source: OWRD 2019b

In some instances, the Forest Service can lay claim to water rights on lands they administer. When the United States reserves public land for certain uses such as Indian reservations, military reservations, national parks, national forests, or monuments, it also implicitly reserves sufficient water to satisfy the purposes for which the reservations were created. Reservations made by either presidential executive order, or by an act of Congress, have implied reserved water rights. These are defined as federal reserved water rights. The date of priority of a federal reserved water right is the date the reservation was established (DOJ 2019).

In 1893, lands along each side of the crest of the Cascade mountain range were incorporated into, and federally designated as the Cascade Range Forest Reserve. When the Cascade Range Forest Reserve was dismantled into smaller, individual national forests in the early 1900s, the Oregon National Forest was officially established on July 1, 1908. It included lands containing what is now the Mount Hood National Forest, and was renamed such in 1924 (MHNF 2019). Included in those lands was the then Bull Run Timberland Reserve, and the Dalles Municipal Watershed. The priority date for federal reserved water rights on the Mt. Hood National Forest would relay back to the initial year of origin of the federal Forest Reserve in 1893.

The priority dates for the City of The Dalles' water rights for Dog River and the South Fork of Mill Creek pre-date the establishment of the Mt. Hood National Forest. Accordingly, these rights have priority over the federal reserved water rights on the Forest (OWRD 2002). Additionally, any claims by the Forest Service to such rights would be subject to the state's adjudication process. To-date, the Forest Service has not submitted any claims for federal reserved water rights in the Dog River and South Fork Mill subwatersheds.

3.3.2 Effects Analysis

The hydrologic analysis was conducted to determine the effects to water quantity, water quality, channel and riparian features, and water rights that could be expected as a consequence of no action; or as a result of implementing the proposed action. The Proposed Action is the replacement of the existing pipeline with a new pipeline, allowing the City of The Dalles to utilize more efficiently the water being diverted from Dog River. The existing 3.4 mile pipeline would be replaced with a 24-inch-diameter pipe. It would be located parallel and next to the existing alignment as much as possible.

In addition to pipeline replacement, the project will repair and improve the diversion structure and install fish screens and passage structure, install a new culvert under the access road crossing Brooks Meadows Creek, and improve summer low flows by adding 0.5 cfs into Dog River below the point of diversion during August, September, and October. Implementation of the proposed action would include the use of BMPs and PDCs identified to minimize effects to natural and cultural resources.

Methodology

Analysis of the effects to hydrologic resources discerns the cause and effect relationship of constructing and then operating and maintaining the new diversion and pipeline. Key to the analysis of effects is the location and proximity of activities in relation to water resources, the extent and connectivity of disturbances to the stream and riparian network, and any alterations in the amount and timing of diverted streamflow. Potential effects that could result from each of the alternatives is addressed relative to the existing condition. Since the pipeline transfers water from one subwatershed to another, the effects to Dog River and the South Fork of Mill Creek are considered.

Effects from construction activities would presumably occur until work is completed. Construction activities to consider include excavation of the trench, staging and transport of equipment and materials, pipeline assembly, and back-fill. Effects due to operations and maintenance could be expected to occur as long as the pipeline is in use. Future operations of the pipeline diversion could change. Demand is expected to increase with a rise in future population. Effects from future climate change could necessitate that the City adaptively manage their water use in the face of a shifting available supply. Future changes to operations are based on inferred projections.

Much of the analysis relies on existing information. Hydrologic data were used for basic computations and quantitative comparisons, including for use in a modeled environment as input variables. Spatial and topographic data were used in a GIS environment to evaluate proximal relations and links. Research and academic studies were used to rationalize local application of conventional theory. Watershed and landscape assessments that have been conducted for the area provided local observations and conditions for context. Lastly, several key assumptions were used to constrain the hydrologic analysis.

Key assumption(s) applied to the analysis of hydrologic effects included:

- Dog River diversion operations would not change for either alternative for a minimum of at least 10 years, and would remain the same from November through July.
- For the Proposed Action, the City of The Dalles would contribute 0.5 cfs bypass flow down Dog River below the point of diversion from August through October.
- The primary fill period for Crow Creek Reservoir would typically be early November to early- or mid-February for both alternatives. Flow to the reservoir would usually be managed from mid-February to late June to maintain pool elevation and supplement storage for meeting peak demand in summer and early fall.
- Increasing the capacity of the Crow Creek Reservoir within the next 10 years is not foreseeable, and may not occur at all depending on the outcome of ASR testing. Should a proposal from the City be submitted to the Mt Hood Nat. Forest to increase the reservoir's capacity, then NEPA would have to be initiated.
- Testing for the City's ASR project will not necessitate that additional flow be diverted from Dog River. There is already enough available flow and storage to suffice testing. The OWRD is the authority that administers the City's limited license to test the ASR and enforces the conditions therein.

3.3.2.1 No Action Alternative

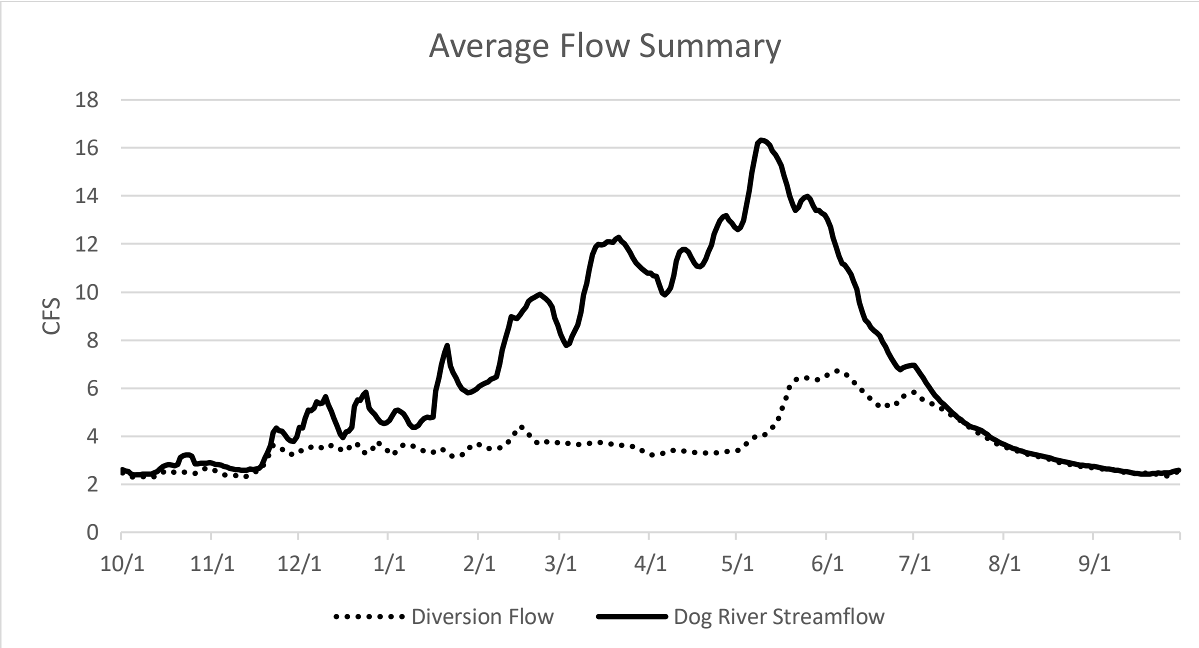
The No Action Alternative would continue the status quo. The pipeline and diversion structure would not be replaced or upgraded. Operations of the existing Dog River diversion and pipeline would not change. Water loss from leakage would continue unabated. A new culvert to route Brooks Meadow Creek under the pipeline access road would not be constructed.

Water Quantity and Streamflow

Dog River

Under the No Action Alternative, the quantity of water diverted from upper Dog River and its tributaries would remain unchanged from current conditions. On average, Dog River would continue to provide for about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer would be expected to average about 7.0 cfs, and about 2.5 cfs during late summer. In most years, the headworks at the pipeline inlet would be operated to increase diverted flow in the late fall and early winter to re-fill Crow Creek reservoir, by early or mid-February if possible. Once full, the amount of diversion would be reduced manually to a maintenance flow of about 2-3 cfs until mid- to late-May (Figure 18). Then the rate of diversion would be increased to capture the entire amount of upper Dog River's base flow from July through September and early October to meet peak demand.

Figure 18. Mean daily discharge (cfs) summary of an average water year that was diverted into the City of The Dalles pipeline during 2012 through 2018 compared to the mean daily discharge of Dog River above the diversion



Source: CTD 2018

Effects to streamflow from pipeline diversion would continue to be greatest during the late summer and early fall when flows are lowest, and 100 percent of upper Dog River is diverted into the pipeline (see Table 18). During this time, the lowest eighth of a mile segment of Reach 3 below the pipeline diversion would become partially dewatered. Instream flows to this segment would be restored naturally just downstream by springs, seeps, and hyporheic flow. Lower Dog River would remain a perennial stream type (Figure 19).

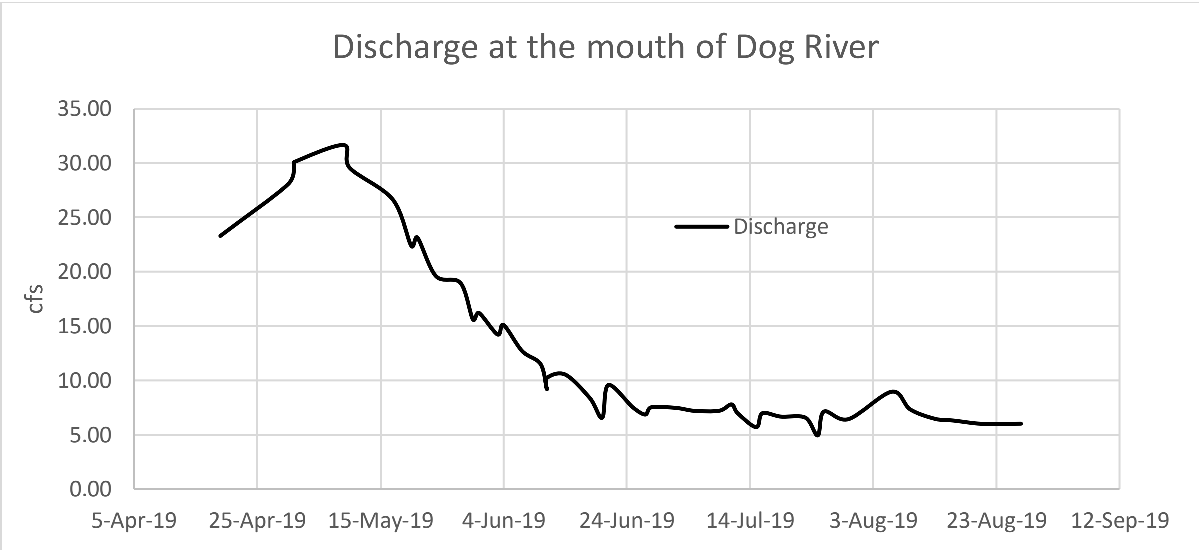
Table 18. Estimated Percent of Mean daily discharge (cfs) of Upper Dog River Diverted May through October.

	May	June	July	August	September	October
Percent of Dog River diverted	39	99	100	100	100	99

Source: CTD 2018

It is estimated that Puppy Creek would continue to potentially contribute on average nearly 4 percent of the base flow to lower Dog River, and Brooks Meadow Creek could potentially contribute nearly 12 percent of its base (USGS 2017). Ground water contributions to lower Dog River would also continue to supplement base flows. The perennial sources of near-bank springs and seeps along the lower reaches below the diversion would continue to provide unceasing flow during summer months.

Figure 19. Instantaneous Discharge measured near the mouth of Dog River spring through late-summer of 2019



When the entire flow of upper Dog River is being diverted to the pipeline in the summer and early fall, the river at the mouth would continue to flow perennially. Despite the diversion of all the summer low flow that's produced from the Upper catchment, as much as 40 percent or more gain of available daily flow could be expected at the mouth of Dog River (Table 19). But overall, full capture of flows during the summer and late fall would continue to reduce natural mean monthly base flows at the mouth of Dog River by an estimated 30 to 40 percent.

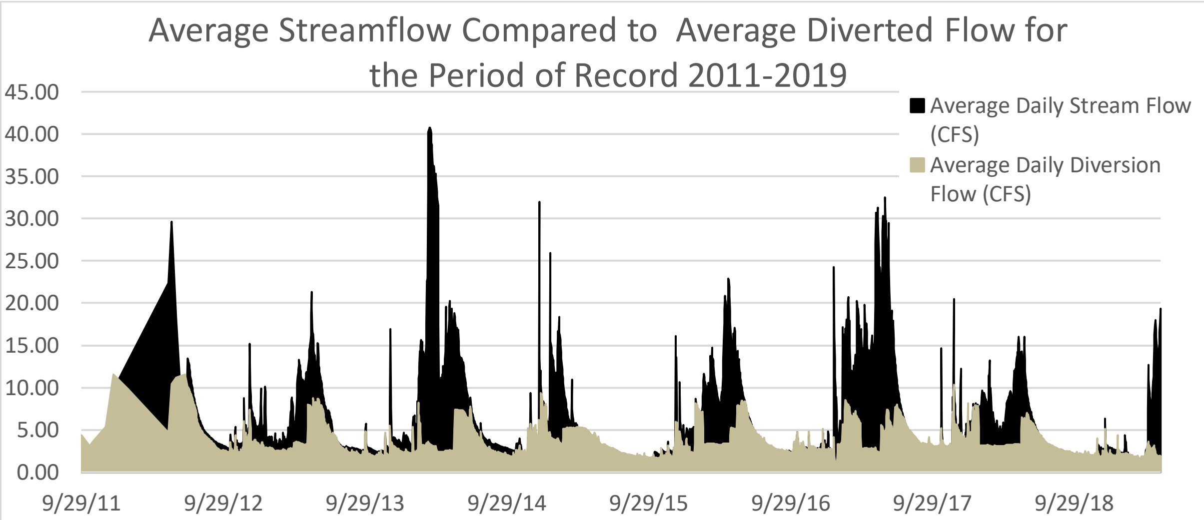
Table 19. Comparison of Discharge (cfs) in Dog River Measured Above and Below the Diversion on Select Dates.

Location	July 20, 1972	July 27, 2000	July 27, 2016	May 1, 2019
RM 6.0 Above Diversion (fully diverted flow)	6.2[1]	4.0[2]	3.2[3]	14.91[5]
RM 0.0 Near Mouth	NA	8.3[3]	5.3[4]	30.1[5]
RM 3.0 in Reach 2	9.0[1]			

Sources: [1]HRWG 1999, [2]MHF 2000b stream survey, [3]CTD 2017b, [4]CTWS 2017, [5]OWRD 2019

The effects of diversion on peak flows would continue to be greatest during the late fall and early winter months when Crow Creek Reservoir is filling. Diversion will decrease the overall magnitude of mean daily peak flows in Dog River during that time. Data indicates it could be by as much as 70 percent in a year when total fall/winter precipitation is below normal. The majority of peak runoff however, which occurs in the spring, would not be expected to be attenuated nearly to that degree. This is because in most years, Crow Creek Reservoir would be filled by early to mid-February. Typically, the majority of the spring freshet would not be diverted, and would pass downstream to lower Dog River (see Figure 20).

Figure 20. A comparison of average streamflow and diverted flow from 2011 through 2018 above the Dog River diversion to illustrate the amount of spring peak flows that would bypass to lower Dog River.

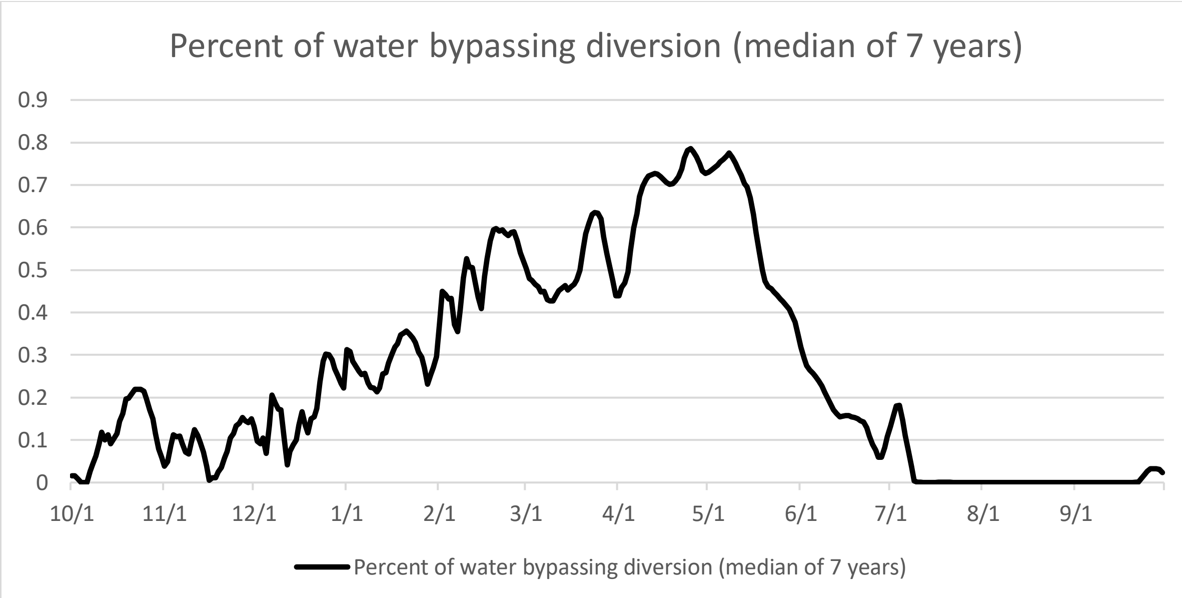


Source: CTD 2018

In lower Dog River, the attenuation of winter peak flows would be less of an effect than the upper river because of the contributions from perennial and intermittent streams in the Lower catchment. Puppy Creek for example would continue to potentially contribute on average about 19 percent of peak flow in lower Dog River, while Brooks Meadow Creek's contribution could average about 4 percent of the peak (USGS 2017).

Annually, there would continue to be an amount of bypass streamflow available to lower Dog River. Only a portion of streamflow would be diverted from upper Dog River from November to June. During some months bypass flows would likely be greater than diverted flows. Based on past records, the percentage of total streamflow that would not be diverted, and flow past the point of diversion and stay in the main stem of Dog River can be displayed as a percentage of total streamflow (Figure 21). The maximum amount of bypass flow would be expected to continue during late April and early May and would account for between 70 and 80 percent of the total available flow from upper Dog River.

Figure 21. The amount of mean daily streamflow that bypassed (undiverted flow) the pipeline diversion down Dog River, expressed as a percentage of total available streamflow for water years 2012 to 2018.



Source: MHNF 2018

Because the existing aging pipeline would not be replaced under the No Action alternative, it would continue to leak from a number of places. At full pipe capacity, leakage could be as much as 1.9 cfs. But there have only been four instances since 2006 when the Dog River pipeline was filled to maximum capacity, so that quantity of water loss would not be expected to occur very often. The location and severity of leaks would likely continue to vary. Some leaks would only be present or visible during periods of elevated flow within the pipeline, when the range of pressure and velocity are near their highest. At lower flows some leaks would not be detectable, or become a slight trickle.

The amount and fate of pipeline leakage would remain uncertain. It's likely that a proportion of leakage could not be accounted for. A proportion of it would probably return slowly to the local aquifers to be stored and released steadily over time. During peak runoff, the larger leaks would follow overland flow routes to an existing intermittent or perennial channel. Depending on the location of the leak some could return to Dog River, while some could contribute to the South Fork of Mill Creek. Some water loss would likely be depleted by evapotranspiration, and some would probably be stored in the soil profile. Given the geology of the area, there could be a proportion that drains to deeper aquifers for long-term storage and release elsewhere.

The amount of water loss from the leaking pipeline would be expected to continue, although repairs and patches to limit known leaks could be made under the authority of the Special Use Permit. Repairing leaks in water conveyance infrastructure has been a strategy identified in the City's Water Management and Conservation Plan (CTD 2014).

In practice, the total amount of water loss from leakage would continue to factor into the amount of water withdrawn from upper Dog River. Loss from leakage would continue to decrease efficiency of use so that water would be withdrawn to meet operational demand. The quantity of water diverted from upper Dog River will continue to include the amount of leakage plus what's needed to meet demand.

The effects of forest management on water quantity and streamflow in the subwatershed would continue to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2015 to be below thresholds of concern (Table 20).

Since then, there has been no new road construction, and only a minor extent of past thinning. Effects of forest management on stream flow would remain negligible. There would remain however, 5 crossings over perennial streams where segments of road would periodically divert intercepted runoff toward streams, a portion of which would likely enter the stream during high runoff events. Under the No Action alternative, the one crossing where the pipeline access road intersects with Brooks Meadow Creek would not be improved. Nonetheless, the amount of contributing area to those crossings would remain a very small percentage overall. Hydrologic recovery from any past activities would continue to improve.

Table 20. Road Density and Watershed Impact Areas in the Dog River Subwatershed in 2015. No changes are expected in these indicators under the No Action alternative.

Indicator	2015	Threshold of Concern
Road Density (mi/sq mi)	2.4	3.0
Watershed Impact Area (%)	3	25

Source: MHNF 2015

It is estimated that Dog River would continue to contribute about 4 percent of the mean annual discharge to the East Fork Hood River (HRWG 1999), above the confluence with Middle Fork Hood River. Diversion from Dog River would decrease its mean annual contribution to the East Fork Hood River by an estimated 2 percent.

Despite the No Action alternative, the City would continue to move forward with testing of an ASR system on their property under a limited license issued to them in 2018 by OWRD. Testing is not reliant on replacement of the pipeline. Water to be used for the ASR would be supplied by the surface water rights in the municipal watershed, which include Dog River, South Fork Mill Creek, and Crow Creek reservoir. In the issuance of the license OWRD estimated that existing surface flow and storage is available for the City's ASR project (OWRD 2018). OWRD would be the authority that administers the limited license agreement and enforces its terms and conditions.

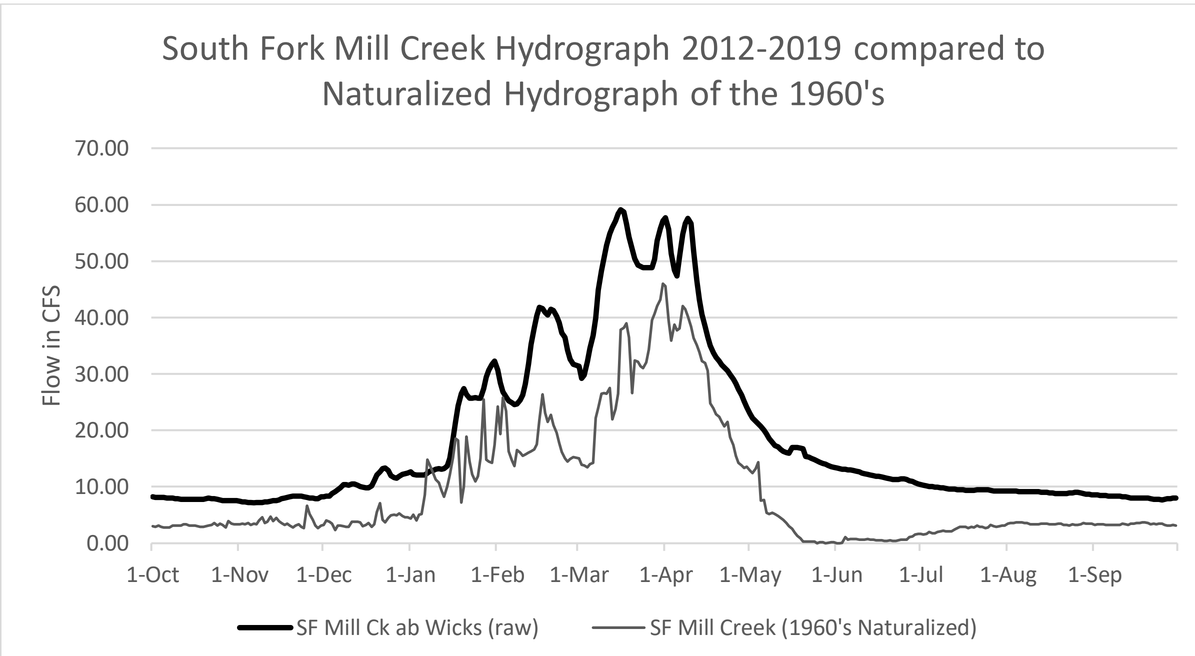
At peak demand it is estimated that ASR testing would use approximately 1.03 cfs (244 million gallons per year). This increase in demand could be expected to be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would not be a need for additional water diverted from Dog River to meet the increase in demand for ASR in most years (CTD 2019a).

South Fork Mill Creek

Under the No Action alternative, the amount and timing of flow diverted from Dog River to South Fork Mill Creek would continue to be managed to meet municipal demand. Operations of the Dog River pipeline and Crow Creek reservoir would capture both the naturalized streamflow from upper South Fork Mill Creek, and the diverted flow from upper Dog River until maximum storage (full-pool) would be achieved in mid- to late winter. Diverted flow would be dialed back after the reservoir becomes full so as to minimize spill while maintaining its surface elevation at full-pool. Water operations would be adjusted through the year to try and balance the capture of available flow, the quantity of diversion, storage, spill, and release with annual variation in demand.

Total streamflow in SF Mill Creek would continue to be artificially inflated above natural conditions (Figure 22). Inflow from Dog River and storage release from the reservoir would continue to increase base and mean annual streamflow. Streamflow would still vary seasonally as it would under natural conditions, but there would continue to be more available flow overall.

Figure 22. Mean daily flow in South Fork Mill Creek above the Wicks water treatment plant intake exhibiting the estimated increase in streamflow above the natural flow regime.



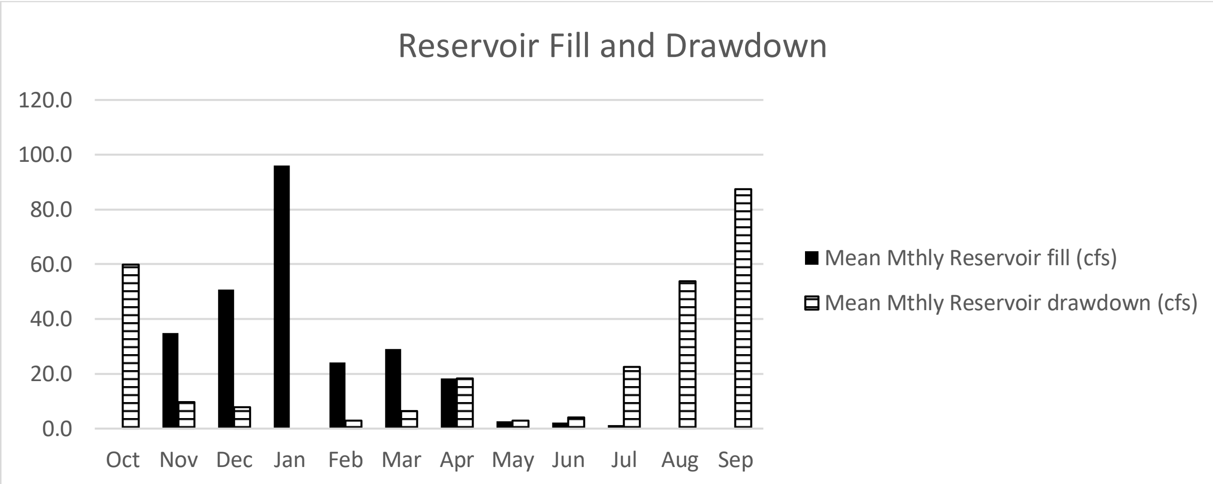
Source: CTD 2019

On average, Dog River would continue to contribute about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer would average about 7.0 cfs, and about 2.5 cfs during late summer. In Reach 2 between the pipeline outlet and Crow Creek Reservoir this contribution would amount to about 5 times more streamflow than the natural base flow. In the late fall and early winter, the amount of diverted flow would be increased to try and re-fill Crow Creek reservoir by early or mid-February. Once full, the amount of diversion would be reduced to a maintenance flow of about 2-3 cfs until mid- to late-May. Then the rate of diversion would be increased to capture the entire amount of upper Dog River's base flow from July through September and early October.

Dam releases and diverted flow from Dog River would continue to be managed to meet peak demand during the summer months. Base flows just above the Wicks water treatment plant near the mouth of the South Fork Mill would remain elevated by more than double that of estimated natural discharge. Reliable late summer flows from these surface water sources, including available live flows and stored water releases, would remain an average estimate of 5.4 cfs (CTD 2014).

Release from the reservoir would occur year around primarily to meet municipal demand and provide at least 2.0 cfs to South Fork Mill Creek as stipulated by the reservoir Special Use Permit. Releases of 6 cfs or higher would be common. The quantity needed for release typically fluctuates on a seasonal trend, but may occur weekly or daily too. Inflow into the reservoir would begin to subside in summer, when drawdown of the reservoir would be expected to occur. Typically the City would begin drawdown in early July and then begin refilling in November (Figure 23). Sometimes there would be a need for special releases such as when one of the supplemental wells might be taken off-line.

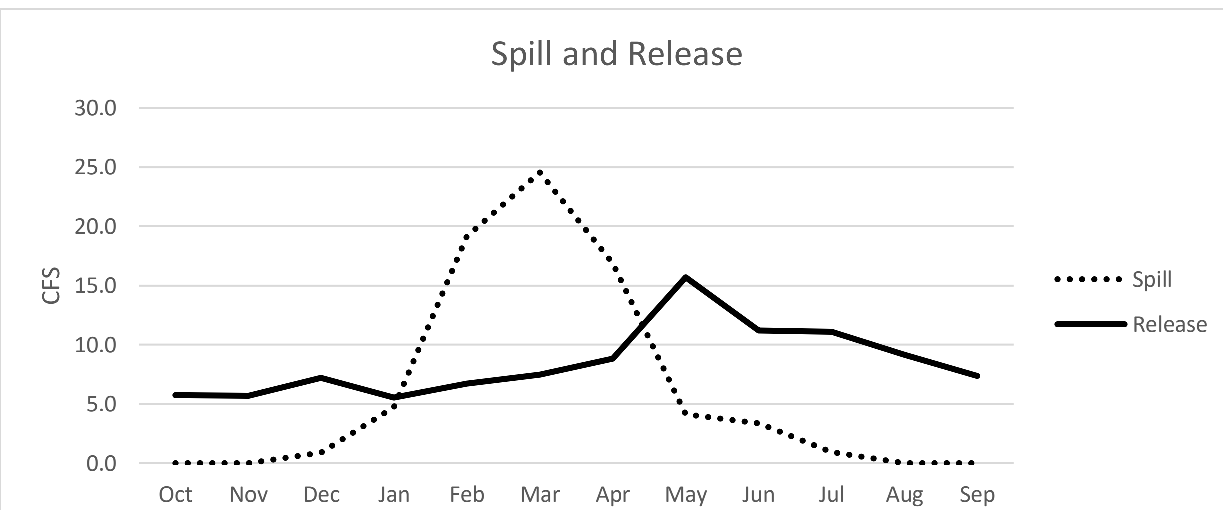
Figure 23. Mean monthly fill and drawdown trends during the period 2005 to 2015.



Source: CTD 2017c

Peak flows would continue to be attenuated to a degree below the Crow Creek dam as a result of storage in the reservoir. Spill over the reservoir however, would still occur during early spring when full-pool is exceeded because diverted flow from Dog River and natural inflow from the Upper catchment will have already filled the reservoir. Spill would continue to be greatest during the winter and spring in response to heavy runoff and precipitation (Figure 24).

Figure 24. Comparison of mean monthly spill and release during the period 2005 to 2015 (CTD 2017c). Note: Spill is not recorded continuously, so missing data has been interpreted by the graphed line.



Source: CTD 2017c Note: Spill is not recorded continuously, so missing data has been interpreted by the graphed line.

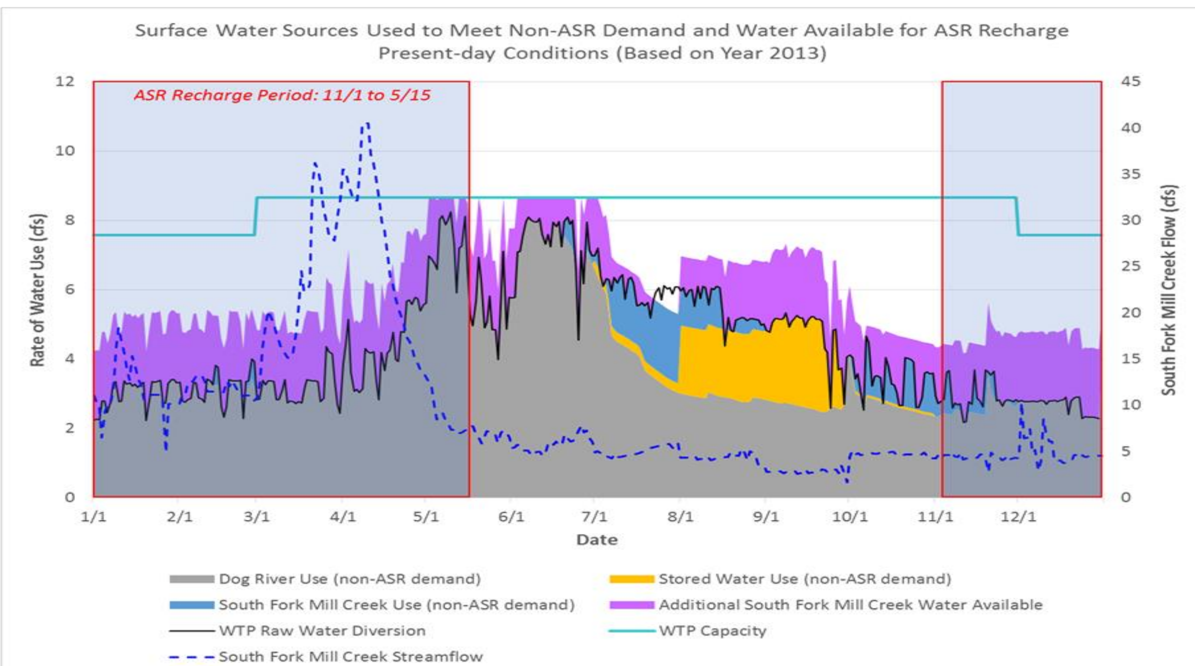
If spill occurs, then less would be needed for release. Spill would not be expected to occur during the early summer to late fall months, when demand and drawdown is highest. Spill would usually be greater than release during winter and spring, and excess to municipal use. Most of this would bypass the Wicks treatment plant intake and flow downstream to Mill Creek, elevating its average natural peak discharge.

Testing for the City's ASR system under their limited license with OWRD could be expected to utilize the spill that typically occurs during the winter and spring (Figure 25). Testing for the ASR would not be reliant on replacement of the Dog River pipeline. The increase in demand to test the ASR would be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average available spill and runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would be available water sufficient for ASR testing (OWRD 2018). OWRD would be the authority that administers the City's limited license and enforces the terms and conditions in the agreement.

The water treatment plant's average intake would be expected to increase during that time because only finished water can be used for ASR testing. This would decrease the amount of winter and spring flow that has typically bypassed the Wicks treatment plant intake and flowed to Mill Creek. This would lower the elevated average peak flow from South Fork Mill that would flow into Mill Creek by an estimated 6 percent.

Under natural flow conditions, South Fork Mill Creek is estimated to have contributed about 69 percent of the mean annual discharge of Mill Creek. Average annual diversion for the Wicks water treatment plant would continue to operate to meet demand, which has traditionally reduced the annual contribution to Mill Creek by an estimated 40 percent (OWRD 2019a). Demand for ASR testing could decrease the mean annual contribution by about another 13 percent.

Figure 25. Comparison of the proportion of the different source water supply with current and projected ASR demand.



Source: CTD 2019a Note: different scale for S. Fk. Mill Creek on right-hand axis. Values above the solid black line (i.e., WTP Raw Water Diversion) represent the volume of unused water currently available for ASR testing.

The effects of forest management on water quantity and streamflow in the subwatershed would continue to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2012 to be below thresholds of concern (Table 21).

Since then, there has not been any new road construction on Forest Service lands. Some roads have been closed and decommissioned. The extent of ongoing fuel treatments (i.e. pile burning) would be minor. Effects of forest management on stream flow would not be expected to change under the No Action alternative, and remain negligible.

There would remain the 4 crossings over perennial streams where segments of road could periodically divert intercepted runoff toward streams, a portion of which likely enters the stream during high runoff events. But the amount of contributing area would be very small. Overall, the South Fork Mill Creek subwatershed would be considered to have minimal hydrologic disturbance from roads, and any long-lasting effects to streamflow would remain slight.

There have been about 3,829 (21%) acres of forest management activities over the last 15 years on Federal lands in and around the South Fork subwatershed. Treatments consisted of thinning, brushing, pruning, underburning, and pile burning to reduce hazardous fuels. They were intended to minimize the potential risks and impacts of wildfire. Best Management Practices were incorporated into treatment design so that watershed effects would be minimized. Existing effects of these past forest management activities, as well as past wildfire, on water quantity and streamflow in the subwatershed would remain slight and continue to diminish.

Table 21. Road Density and Watershed Impact Areas in the South Fork Mill Creek Subwatershed in 2012. No changes are expected in these indicators under the No Action alternative.

Indicator	2012	Threshold of Concern
Road Density (mi/sq mi)	2.6	3.0
Watershed Impact Area (%)	13*	25

Source: MHNF 2012, MHF 2000b *Prior to the Government Flats fire of 2013.

Channel Conditions

For the No Action Alternative, channel characteristics and features would continue to be affected as a result of diverted streamflow from upper Dog River. The timing and magnitude of diverted flow would continue to be managed to the status quo so that Crow Creek Reservoir would get filled by early February. Diversion would then be reduced to a flow that maintains the level of the reservoir through the spring. Then diversion would be increased to capture all of the base flow during the summer and early fall.

Dog River

In the Dog River subwatershed, channel forming processes would continue to be altered by the modified flow regime. Winter and summer flows would continue to be affected most. Early and mid-winter average peak flows would be attenuated to a moderate degree. But most of the streamflow volume comes from the spring snowmelt, so the majority of the spring peak flow would bypass the diversion. During June through October, virtually all of the streamflow from upper Dog River would be diverted to the South Fork Mill Creek.

For most of the length of Dog River, direct access to the channel would remain limited and human perturbation other than water management would be low. The stream banks and main channel could be expected to remain primarily stable, and the sediment supply would not be expected to undergo an aberrant change from previous trends. Substrate would continue to be dominated by gravels and cobbles. The average amount of fine sediment observed through-out all reaches would likely remain low to moderate on an area weighted basis.

Changes to channel forming processes related to modified streamflow would continue to mostly affect Reaches 1, 2, and the lower segment of 3. Effects would be greatest in the lower segment of Reach 3 immediately below the diversion because it would continue to be partially dewatered for a half-mile downstream to Cooks Meadow in the summer and early fall months. The overall reduction in average annual flow and the absence of base flows in this reach would continue to be the cause for the decline of pool depth and quality, a decrease of the width-to-depth ratio, and a reduced wetted perimeter.

Effects to the main channel in Reaches 1 and 2 that make up lower Dog River would continue to be low to moderate, primarily due to the overall reduction of mean base flows that affect the average depths of residual pools (Table 22). The average depth of the primary pools in both reaches could continue to be greater than 2 feet during summer low flows of July, even when 100 percent of the flow of upper Dog River would be diverted. Perennial streamflow from Brooks Meadow and Puppy creeks, as well as the many near-bank springs and seeps would continue to contribute to base flows and alleviate the effects of full diversion. But overall, it is estimated that summer and early fall pool depths at the mouth of Dog River would remain on average about 2 to 3 inches shallower because of diversion during the base flow period.

Pool frequencies in all four reaches would be expected to remain below the LRMP and NMFS standards that are often suggested as indicators of properly functioning channel processes. The attenuation of average peak winter flows resulting from diversion to fill Crow Creek Reservoir in the early- and mid-winter months would be a likely cause for lower pool frequencies below the diversion. The majority of pools that were observed in Reach 3 and 4 however were pocket pools, suggesting the small size of Dog River and its channel types, which have a low inherent potential for new deep pool formation because the stream power and discharge to scour deeper and mobilize larger quantities of bedload is low and infrequent.

Table 22. Observations of Select Channel Characteristics of Dog River from the 2000 Stream Survey Compared to LRMP and NMFS Standards and Guidelines.

Reach	Percent Fine Sediment Observed	LRMP Standard for Percent Fine Sediment	Total Pools per Mile	Primary Pools per Mile	LRMP Standard Primary Pools per Mile	NMFS Standard Primary Pools per Mile
1	8	20	18.8	5.2	96.7	70
2	14	20	16.6	5.1	105.2	70
3	12	20	19.5	0.6	130.5	96
4	6	20	36.5	0.0	190.1	96

Source: MHNF 2000a

Channel forming processes in Reach 4 and the remaining perennial and intermittent tributaries would remain largely unaffected. With the exception of Brooks Meadow Creek, where the pipeline access road crosses through its lower reach. It would continue to heavily impact about 12 feet, or 2 percent of the total channel length. This small short segment would remain in a poorly functioning condition, and an erosion source. Flow would be hindered sometimes, ponding in wheel ruts before passing across and back into the creek.

As observed in the 2000 stream survey, the abundance and density of large woody debris in all reaches of Dog River were low to moderate compared to the LRMP standards (Table 23). But the density of LWD met the NMFS standards in all reaches. Since then, inputs of woody debris have continued to accumulate. Small wood pieces would likely continue to dominate the total percentage of wood in the stream. Some of the small wood will remain a component of debris jams, but the majority of it would likely continue to be individual pieces. The in-stream abundance and density of woody debris would be expected to continue to gradually increase for all size classes because the potential for future recruitment from the inner riparian zone is good to excellent along most of the main stem, and the inner riparian zone for all reaches is dominated by late- and mid-seral forest structure.

Table 23. In-channel woody debris and woody debris density amounts (total of both medium and large size classes) observed in the 2000 Dog River stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	71	40	78	189	16.7	26.7	43.4	106	20
2	119	47	55	221	18.6	21.7	40.3	106	20
3	226	123	47	396	39.2	15	54.2	106	20
4	153	119	43	315	64.8	23.4	88.2	106	20

Source: MHNF 2000a

Data from the 2000 stream survey are useful for interpreting the effects of the modified flow regime on the potential transport, distribution, and accumulation of in-stream woody debris under the No Action Alternative. There were 103 debris jams counted during the stream survey of Dog River in 2000 (Table 24). Twenty-four percent of the total wood inventoried was in these jams. Of the wood in debris jams, 47 percent was in the small size category, 31 percent in the medium size class, and 22 percent in the large size class.

Table 24. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	16	52	19	30	10	56	22
2	15	95	24	40	7	44	11
3	22	199	27	108	15	40	7
4	50	99	54	70	49	26	17

Source: MHNF 2000a

The total amount of in-stream debris jams inventoried suggests that the capability of the flows in Dog River in all reaches would continue to transport and distribute woody debris that could accumulate into jams. But intrinsically, the potential would remain fairly low because the flows and channel size are relatively small. The capability of the winter peak flows that have been attenuated by diversion to transport medium and larger pieces would remain somewhat diminished. Spring peak flows however, could be expected to retain most of their potential to transport larger pieces where the channel is wide and deep enough. Transport potential in the Lower catchment would remain higher than the Upper catchment due to greater mean channel width and depth. In lower Dog River, the potential for maximum peak flows in both winter and spring to transport and re-distribute medium and large pieces of woody debris would remain functional.

South Fork Mill Creek

Under the No Action Alternative, diversion from Dog River and storage and release in Crow Creek Reservoir would continue to modify the flow regime in the South Fork Mill Creek subwatershed. Channel forming processes would remain altered as a result in the main channel. Mid- and early winter flows, spring flows, and summer flows would continue to be affected most. Direct access to the main channel of South Fork Mill Creek would remain limited and human perturbation other than water management would be low.

Above the reservoir, average peak flows in early and mid-winter would remain elevated above naturalized levels due to contributions from diversion. Below the dam, they would be attenuated and less than naturalized rates due to the filling of the reservoir and retention for storage. Average spring peak flows would remain higher than naturalized above and below the dam because of diversion contributions and spill combined with release. Base flows above and below the dam would also remain elevated above naturalized levels due to contributions from diversion and releases downstream.

Elevating average base and peak flows will continue to increase water velocity seasonally and gradually deepen entrenchment. Width-to-depth ratios could be expected to slowly decrease, and the wetted perimeter enlarge. The short segments of channel where unstable and undercut streambanks were observed in Reaches 1 and 2 could progressively expand. For these reasons, pool abundance and quality would remain low (Table 25). Most of the segments in each of these reaches would continue to be fast flowing, and not conducive to pool formation.

Table 25. Observations of Select Channel Characteristics of South Fork Mill Creek from the 2011 Stream Survey Compared to LRMP and NMFS Standards and Guidelines.

Reach	Percent Fine Sediment Observed	LRMP Standard for Percent Fine Sediment	Total Pools per Mile	Primary Pools per Mile	LRMP Standard Primary Pools per Mile	NMFS Standard Primary Pools per Mile
1	5	20	7.9	1.4	76	70
2	23	20	6.3	0.5	115.8	96
3	11	20	0.0	0.0	NA	184

Source: MHNF 2011

Substrate would be expected to remain dominated by coarse gravel. Fine sediment generated by streambank erosion and incision would essentially be routed through the system by the elevated water velocity. Although it could continue to accumulate in the few pools or short aggrading segments in Reaches 1 and 2. Above the dam, the majority of fine sediment generated would most likely continue to settle in the reservoir, while below the dam it could accumulate behind the Wicks intake structure.

The low overall abundance and density of large wood observed in the 2011 stream survey was low, and well below LRMP and NMFS standards (Table 26). Since then, woody debris has continued to accumulate. Small wood pieces would likely continue to dominate the total percentage of wood in the stream. Some of the small wood will remain a component of debris jams, but the majority of it would likely continue to be individual pieces.

The in-stream abundance and density of woody debris would be expected to continue to gradually increase for all size classes in the Upper catchment because the potential for future recruitment from the inner riparian zone is good to excellent along most of the main stem where the inner riparian zone is dominated by late-seral forest structure. In the Lower catchment, potential recruitment is good along the main corridor of South Fork Mill Creek, but fair to poor in the outer riparian zones where the 1967 School Marm and the 2013 Government Flats fire burned over the forest. Further down, the vegetation type changes to more scrub-oak and the main stem is comprised of willows and cottonwood.

Table 26. In-channel woody debris and woody debris density amounts (total of both medium and large size classes) observed in the 2011 stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	77	17	3	97	5.8	1.0	6.8	106	20
2	134	37	32	203	8.7	7.5	16.2	106	20
3	10	2	1	13	5.4	2.7	8.1	106	20

Source: MHNF 2011

Data from the 2011 stream survey are useful for interpreting the effects of the modified flow regime on the potential transport, distribution, and accumulation of in-stream woody debris under the No Action Alternative. There were 129 debris jams counted during the stream survey of South Fork Mill Creek in 2011 (Table 27). Debris jams in Reaches 1 and 3 were all comprised of small wood, and 97 percent of the wood in jams in Reach 2 included small wood.

Table 27. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	32	45	32	17	0	3	0
2	90	47	87	34	3	32	0
3	7	3	7	2	0	1	0

Source: MHNF 2011

The total amount of in-stream debris jams inventoried suggests that the capability of the flows in South Fork Mill Creek in all reaches would continue to transport and distribute woody debris that could accumulate into jams. But intrinsically, the potential would remain fairly low above the dam because the channel sizes are relatively small.

The capability of the attenuated winter peak flows below the dam, as well as the reservoir itself would continue to be diminished. The enhanced spring peak flows however would continue to be capable of transporting and re-distributing medium and larger pieces where the channel is wide and deep enough. Transport potential in the Lower catchment would remain higher than the Upper catchment due to greater mean channel width and depth.

Water Quality

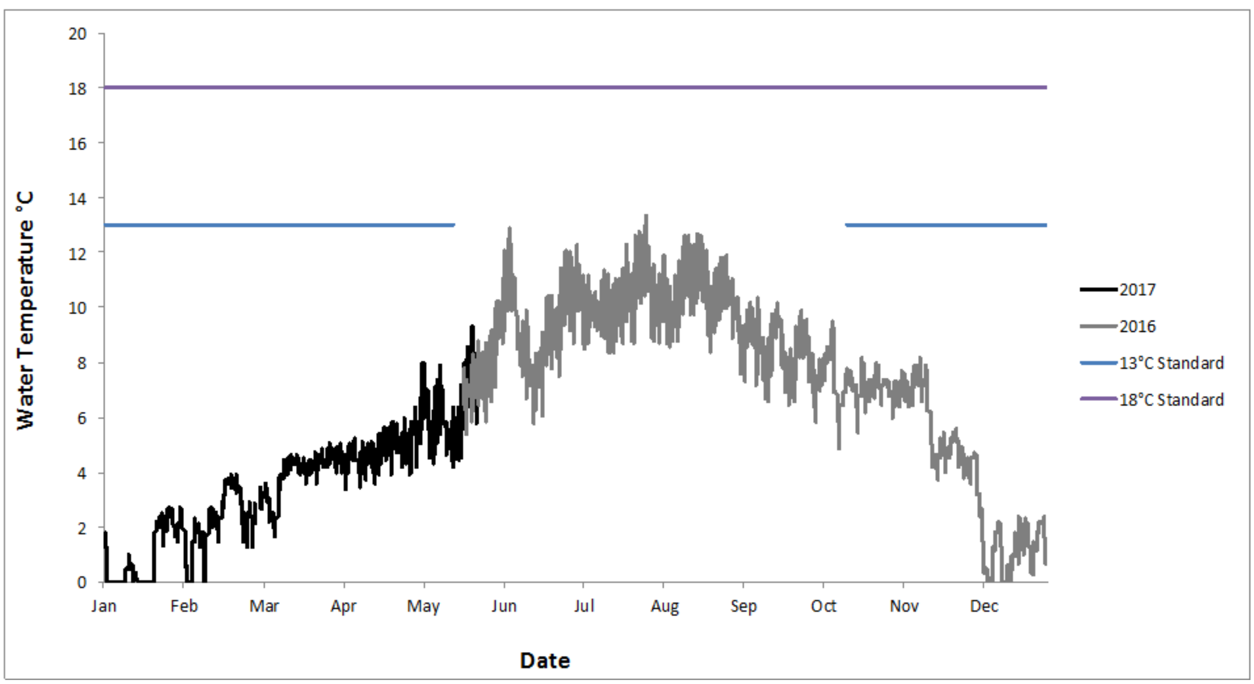
For the No Action Alternative, water quality would continue to be affected by diverted streamflow from upper Dog River. The timing and magnitude of diverted flow would continue to be managed to the status quo so that Crow Creek Reservoir would get filled by early February. Diversion would then be reduced to a flow that maintains the level of the reservoir through the spring. Then diversion would be increased to capture all of the base flow during the summer and early fall.

Dog River

Under the No Action Alternative, only one water quality standard for the designated beneficial uses of Dog River would remain impaired. Iron would continue to exceed the standard for that constituent, keeping Dog River on ODEQ's 303(d) list of Category 5 waters identified in their 2012 Integrated Report. It would remain a non-point contaminant because the source of the quantities detected would still be unknown. It has been surmised that iron may be naturally occurring, and its presence could be due to the geologic formations that underlie the area (ODEQ 2017c). Other impairments would not be expected to result from the Proposed Action, and no other point source or non-point source pollutants, contaminants, or water quality exceedances would be anticipated.

The seasonal trends in stream temperature observed at the mouth of Dog River would be expected to continue (Figure 26). Stream temperature would not be affected under the No Action Alternative. Dog River stream temperatures would remain cold both above and below the diversion year-round, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses. Due to the presence and use by salmon and steelhead of the lowest 2.5 miles of Dog River, and because of the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature would continue to be ongoing by the MHNF.

Figure 26. Daily average temperature data observed in Dog River upstream of the confluence of the East Fork Hood River.



Source: CTWS 2017

The potential for Dog River to provide cold-water thermal refuge for aquatic species would remain high because of the groundwater inputs from springs and wet meadows. Cold water contributions to lower Dog River from Puppy and Brooks Meadow Creeks would also continue. Dog River would remain a cold water source for the East Fork Hood River in the low flow periods of late summer and early fall, including when full diversion into the pipeline would occur upstream at RM 6.0. Lower Dog River could be expected to remain a likely location as a core cold water habitat.

Residual effects to riparian shading from past forest management would continue to be negligible in the Dog River subwatershed. Average solar radiation to the main stem and its tributaries would remain low overall, and the majority of the length of Dog River would continue to be effectively shaded. Segments of reaches where shade was lacking would remain, and include two older clearcut plantations along approximately 0.4 miles of lower Dog River where riparian vegetation had been encroached upon during the original harvest in the 1970s, and where several small patches of streamside blowdown occur in both the lower and upper reaches. Natural recovery along these segments from growing streamside vegetation would be expected to continue.

The degree of fine sediment that can potentially enter stream waters in the subwatershed would be generated from the same sources. The greatest potential would continue to come from roads at four crossings over perennial streams. The largest source would continue to be where Highway 35 crosses over lower Dog River. The potential for road grime and grit, as well as winter sanding materials to wash into the stream waters there would remain very high.

Two other crossings, where FS road 44 crosses over Dog River and where FS road 17 crosses over Brooks Meadow Creek would also remain sources of potential fine sediment. Both however, are paved crossings where use is seasonal, sporadic, and relatively low. So the amount of road grit and fine sediment potentially generated at these crossings that could enter stream water would remain relatively low.

The fourth crossing where the potential for fine sediment to enter stream waters would remain high is where Brooks Meadow Creek flows across the top of the 12-foot wide gravel service road that parallels the pipeline. The channel at this crossing has been heavily impacted, and flow is sometimes hindered, ponding in wheel ruts before passing across and back into the creek. Although this road is used very little, water flows across it persistently. When not frozen, this site is always ponded and muddy, it is a potential chronic source of fine sediment. But the area is small, and the stream velocity low, so the amount of sediment that actually gets mobilized into the water column would be relatively low too, except temporarily when a vehicle or OHV occasionally runs through the 10 x 12 foot puddle.

Leakage from the pipeline would continue to occur under the No Action Alternative, and new ones could develop. During high flows, when flow velocities generate high pressure, the larger of these leaks would continue to erode flow paths to existing intermittent or perennial channels, potentially delivering fine sediment to stream waters that could temporarily increase turbidity.

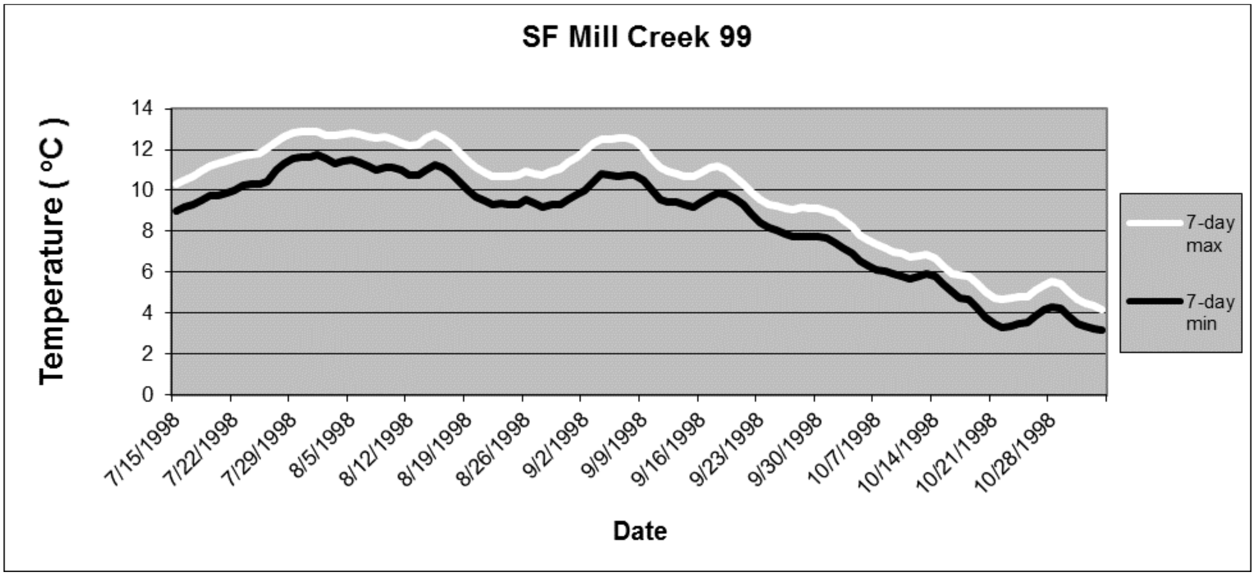
Additionally, given the age and current condition of the existing pipeline, there would remain a risk of catastrophic failure. If catastrophic failure of the pipeline were to occur, particularly on a steep slope, gully erosion could be expected. Deposition of fine sediment and elevated turbidity would be expected as a result, and would continue until the diversion could be shut down.

South Fork Mill Creek

Under the No Action Alternative, existing effects to the water quality of South Fork Mill Creek would remain unchanged. There would continue to be no impairments to the designated beneficial uses. Other than seasonal or storm variation the quality of the stream water in the creek would be expected to remain very good. Occasionally, high concentrations of coliform could be expected to be detected by the City at the Wicks Water Treatment plant, probably originating from wildlife fecal contamination. In the past, they have also detected slightly elevated concentrations of phosphorus, possibly from accumulated sediments in the reservoir. But the dilution provided by the inflow of water from Dog River would continue to abate any effect that could necessitate special treatment.

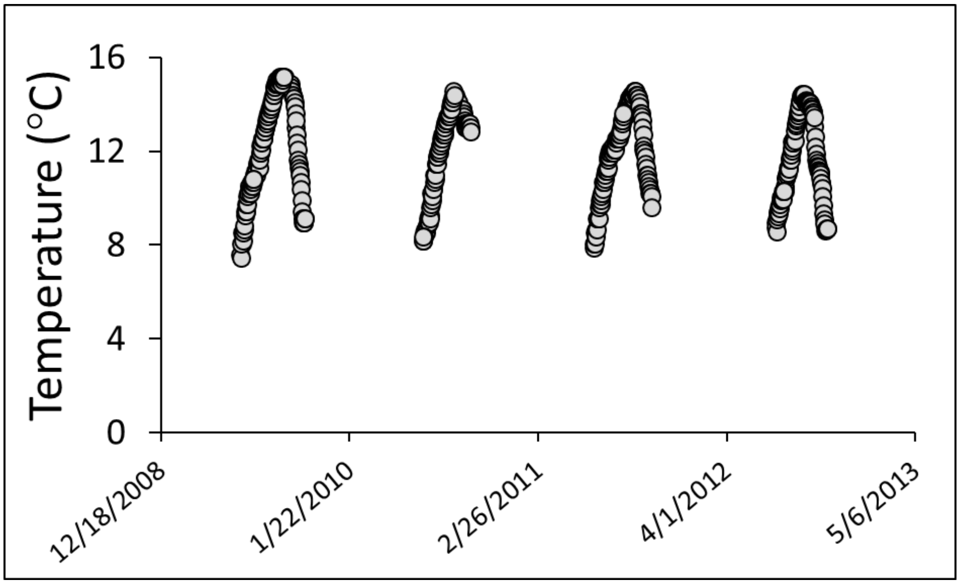
The seasonal trends in stream temperature observed below the Crow Creek Reservoir would be expected to continue (Figure 27). Stream temperature would not be affected under the No Action Alternative. South Fork Mill Creek stream temperatures would remain cold year-round below the dam, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses.

Figure 27. Seven-day-minimum and maximum temperatures in South Fork Mill Creek at the USFS boundary (MHNF 1999) below Crow Creek Reservoir.



Just below the dam however, the seven-day summer maximum temperature would continue to commonly be slightly increased above the 13ºC standard (Figure 28). This is thought to result when drawdown during peak use in the summer would lower reservoir levels, resulting in the potential increase of temperature in the stored water that would be released into the creek. Regardless, stream temperature would not be considered to be degrading water quality in the South Fork Mill Creek. Due to the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature by the MHNF would continue.

Figure 28. Summer average daily temperature for South Fork Mill Creek (elevation of 2,500 feet), downstream of Crow Creek Reservoir near the Forest boundary.



Source: MHNF 2017

Residual effects to riparian shading from past forest management would continue to be negligible in the South Fork Mill Creek subwatershed. Average solar radiation to the main stem and its tributaries would remain low overall, and the majority of the length of South Fork Mill Creek would continue to be effectively shaded. Segments of reaches where riparian shade had been impacted by the Government Flats wildfire would continue to recover from growing streamside vegetation.

Fine sediment and turbidity would not be expected to become an impairment to the water quality of South Fork Mill Creek under the No Action Alternative. There would remain however, existing anthropogenic sources of fine sediment in the subwatershed. The primary sources on Forest Service lands are where certain segments of road connect to the channel network at specific perennial stream crossings, and where several segments of the upper reach have become slightly more incised, and in the lower reach where there is some evidence of unstable stream banks.

Three crossings associated with FS road 1721 where it crosses over Stroud Springs, the South Fork of Mill Creek, and at Alder Creek would continue to have the potential to deliver fine sediment to stream waters. The relative amount of sediment potentially delivered from these crossings would be low because these crossings are within the Municipal Watershed, which is closed to public use and gets very little traffic. The drainage structures on this road are in good condition, and have been purposefully constructed to minimize the length of road connected to the stream network. Also, all three crossings are upstream of Crow Creek Reservoir, where road sediment would be expected to settle and accumulate

A fourth crossing is currently a bridge where FS road 1720-190 crosses the South Fork of Mill Creek about ¾ of a mile below the dam. It too is within the Municipal Watershed, and seldom used. The amount of fine sediment that it could potentially generate and deliver to the creek would also be expected to remain low.

A low-water ford located about 3.5 miles downstream of the dam on non-Federal land has the potential to generate and deliver fine sediment to the creek. But it too is seldom used. It is not always passable. Periodically, it could get used during low flow periods when it would be safe to cross over. When crossed by a motorized vehicle, it could be expected that a small measure of sediment is stirred and mobilized.

The duration of the disturbance would be brief, so the amount of sediment generated would be minor and short-lived.

The hydrologic regime of the South Fork Mill Creek would continue to be altered due to the diverted flows from Dog River, the seasonal spill around Crow Creek dam, and the timed releases from the reservoir. Average peak and base flows will continue to be elevated, increasing water velocity and stream turbulence. The channel and streambanks would continue to slowly adjust incrementally. Increases in sedimentation and turbidity could be expected as a result, particularly during the spring spill and late summer releases. But since the degree of channel incision and bank erosion is not widely extensive after many decades of an altered hydrologic regime, the amount of fine sediment generated as a result would continue to remain only a slight increase.

Leakage from the pipeline would continue to occur under the No Action Alternative, and new ones could develop. During high flows, when flow velocities generate high pressure, the larger of these leaks would continue to erode flow paths to existing intermittent or perennial channels, potentially delivering fine sediment to stream waters that could temporarily increase turbidity.

Additionally, given the age and current condition of the existing pipeline, there would remain a risk of catastrophic failure. If catastrophic failure of the pipeline were to occur, particularly on a steep slope, gully erosion could be expected. Deposition of fine sediment and elevated turbidity would be expected as a result, and would continue until the diversion could be shut down.

Water Rights

The City of The Dalles would continue to use surface waters certificated by the OWRD for municipal use from Dog River and the South Fork of Mill Creek, which include the four water rights currently in their name (Table 28). The amount and designated purpose of use authorized under these existing water rights would not be expanded or transferred. The City would continue to have the decreed right to use all of the water in upper Dog River above the point of the pipeline diversion, and 2 cfs from South Fork Mill Creek above the Wicks water treatment plant. The priority dates for these two surface water sources precede all other claims, so they would remain senior to all other water rights from those streams. Because they are decreed and certificated municipal water rights, they will not be subject to standard forfeiture statutes, and will be protected against injurious claims (ORS 540.610 and 538.410 respectively).

Table 28. Surface Water Right Certificates for Dog River and South Fork of Mill Creek that are designated for municipal use.

City of the Dalles

Source	Application	Permit	Certificate	Claim, Decree, or Transfer	Priority date	Type of Beneficial Use	Authorized Rate or Annual Volume
Dog River			14954	Hood River decree	8/1/1870	Municipal	"All the water in stream at point of diversion"
South Fork Mill Creek			5691	Mill Creek decree	1862	Municipal	2 cfs
Crow Creek reservoir	S-43668	S-32479	60410		5/29/1967	Municipal	955 AF
South Fork Mill Creek, Dog River	R-43667	R-4988	44917		5/29/1967	Storage for Municipal	955 AF

Source: OWRDb 2019. Note: Definitions: *Permit* – Applicant has been approved to develop a water source for its designated beneficial use. *Certificate* – Applicant has "perfected" and developed the water right as per the conditions of the permit. The water right has become certified to the holder. *Decree* – Court issued water right to a holder.

These water rights would remain the purview of the OWRD, the state authority that regulates and administers their use and insures consistency with the requirements of Oregon Revised Statutes and Administrative Rules. OWRD would continue to monitor the City of the Dalles to ensure compliance with Oregon Water Law pertaining to municipal use. The City of The Dalles would continue to report to OWRD their usage, proposed upgrades or changes, and provide planning documents for review consistent with the requirements and statutes for municipal water providers.

The Mt. Hood National Forest does not administer or enforce water rights. The Forest's Special Use Permits however, which authorize the City to operate and maintain the Dog River pipeline and Crow Creek Reservoir facilities located on National Forest System lands, would require that all permitted activities comply with State laws. The Mt. Hood National Forest would continue to rely on the OWRD's oversight of the City's use of water rights for compliance with the applicable State water laws.

The City would be expected to apply for an extension for their two permitted water rights slated to expire in 2021 that would provide them authorization to expand Crow Creek Reservoir, which is identified in the City's 2006 Water System Master Development Plan (permits S-53930 and R-13105). This would keep the water rights for additional storage and increased municipal use in the name of the City. It's anticipated that OWRD would grant them a 10-year extension. If granted, it would be the second extension on each of the permits.

Priority dates for the permits are both January of 1999. Since then, only preliminary plans for raising the height of the dam have been drafted. The City has not submitted any formalized plans or filed for any other requisite approvals to prove-up on the permits so that their water rights could be certificated. Since OWRD would be expected to extend the water right permits however, reservoir expansion would remain an option if needed for the City to meet future demand. But it would remain uncertain when, or if the City intends to proceed because they would continue their search for other storage options. If they were to proceed with reservoir expansion, then NEPA would have to be initiated because the action would partially be located on National Forest System lands.

Under the No Action Alternative, the City would be expected to exercise their limited license to conduct testing to determine the feasibility of an ASR system. The final order for the license was granted to the City by OWRD in October of 2018. The City would be authorized to divert up to 16.7 cfs using their existing water right certificates for Dog River, the South Fork of Mill Creek, and Crow Creek Reservoir. Additional diversion flow from Dog River would not be expected to meet ASR demand. OWRD would administer the City’s use of the limited license, and be responsible for the enforcement of the final order’s conditions.

Two other surface water rights in the Dog River and South Fork Mill Creek subwatersheds would remain held in-trust by OWRD on behalf of the ODFW (Table 29). These water rights would be administered to provide stream flow for the migration, spawning, egg incubation, fry emergence, and juvenile rearing for Coho salmon, summer and winter steelhead, rainbow trout and cutthroat trout. The flow rates allocated to them would remain applicable to the reaches of each stream below the point of diversion for the Dog River pipeline and Crow Creek dam respectively. The priority date for both instream water rights is 1991.

Table 29. In-stream surface water rights in the Dog River and South Fork Mill Creek subwatersheds and the maximum monthly allocation protected by OWRD for instream use.

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dog River below diversion Certificate IS76267A	12.0	12.0	12.0	20.0	20.0	20.0	12.0	7.01	6.05	7.79	14.7	12.0
S Fk Mill Creek below dam Certificate IS72078A	7.0	7.0	10.0	17.0	17.0	7.8	4.8	5.4	6.1	4.8	5.5	7.0

Source: OWRD 2019b

OWRD would continue to administer these instream water rights so that any remaining water available for allocation as a water right in the watershed would be designated for the in-stream purpose. These flow allocations would be the remainder of the estimated natural average flow not being used for other senior users. As described in each of the respective certificates, they would not be expected to represent minimum flow requirements. They would not guarantee actual flow availability at those rates, but rather reflect the maximum allocation protected for the instream beneficial use by the water right. As a condition of the certificate, they would not have priority over human consumption. They would be considered by OWRD to be junior to the City of The Dalles municipal water rights in Dog River and South Fork Mill Creek.

The City of The Dalles’ water rights for Dog River and the South Fork of Mill Creek would remain senior to any federal reserved water rights because their priority pre-dates that of the establishment of the Mt. Hood National Forest (OWRD 2002). Any claims by the Forest Service to such rights would be subject to the state’s adjudication process. The Forest Service would not be expected to submit any claims or assertion for federal reserved water rights in the Dog River and South Fork Mill subwatersheds.

3.3.2.2 Proposed Action Alternative

The Proposed Action is the replacement of the existing pipeline with a new pipeline, allowing the City of The Dalles to utilize more efficiently the water being diverted from Dog River. The existing 3.4 mile pipeline would be replaced with a seam-sealed 24-inch-diameter pipe. It would be located parallel and next to the existing alignment as much as possible. Decades-old leakage would be rectified.

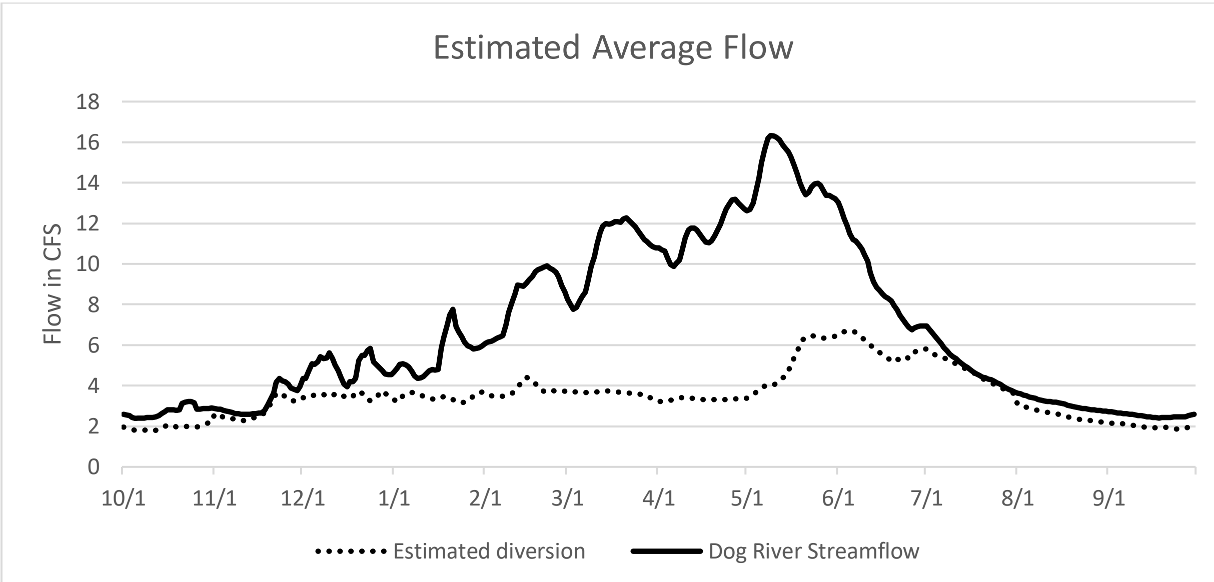
In addition to pipeline replacement, the project will repair and improve the diversion structure and install fish screens and passage structure, install a new culvert under the service road crossing Brooks Meadows Creek that would provide passage for aquatic organisms, and improve summer low flows by adding 0.5 cfs into Dog River below the point of diversion during August, September, and October. Implementation of the proposed action would include the use of BMPs and PDC identified to minimize effects to natural and cultural resources.

Water Quantity and Streamflow

Dog River

Under the Proposed Action Alternative, the quantity of water diverted from upper Dog River and its tributaries would remain unchanged from current conditions between early November and Late July. On average, Dog River would continue to provide for about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer would be expected to average about 7.0 cfs, and about 2.0 cfs during late summer. In most years, the headworks at the pipeline inlet would be operated to increase diverted flow in the late fall and early winter to re-fill Crow Creek reservoir, by early or mid-February if possible. Once full, the amount of diversion would be reduced manually to a maintenance flow of about 2-3 cfs until mid- to late May. Then the rate of diversion would be increased to capture the entire amount of upper Dog River's base flow through July. The City would then reduce the amount of flow diverted between August 1 and October 31 to allow a proportion (0.5 cfs) of the base flow to bypass downstream to lower Dog River (Figure 29).

Figure 29. Mean daily discharge summary of an average water year that was diverted into the City's pipeline during 2012 through 2018, minus 0.5 cfs bypass flow to be offered 8/1 through 10/31, compared to mean daily discharge of Dog River above diversion



Source: CTD 2018

Effects to streamflow from pipeline diversion would continue to be greatest during the summer and early fall when flows are lowest, and an average of 80 to 100 percent of upper Dog River is diverted into the pipeline (see Table 30). During this time, the lowest eighth of a mile segment of Reach 3 below the pipeline diversion would likely be partially dewatered mid-June through late July. Instream flows to this segment would be restored naturally just downstream by springs, seeps, and hyporheic flow. Lower Dog River would continue to be a perennial stream type during this time (Figure 30). Then during late summer and early fall, streamflow would be partially restored with 0.5 cfs of bypass flow from Aug. 1 to Oct. 31.

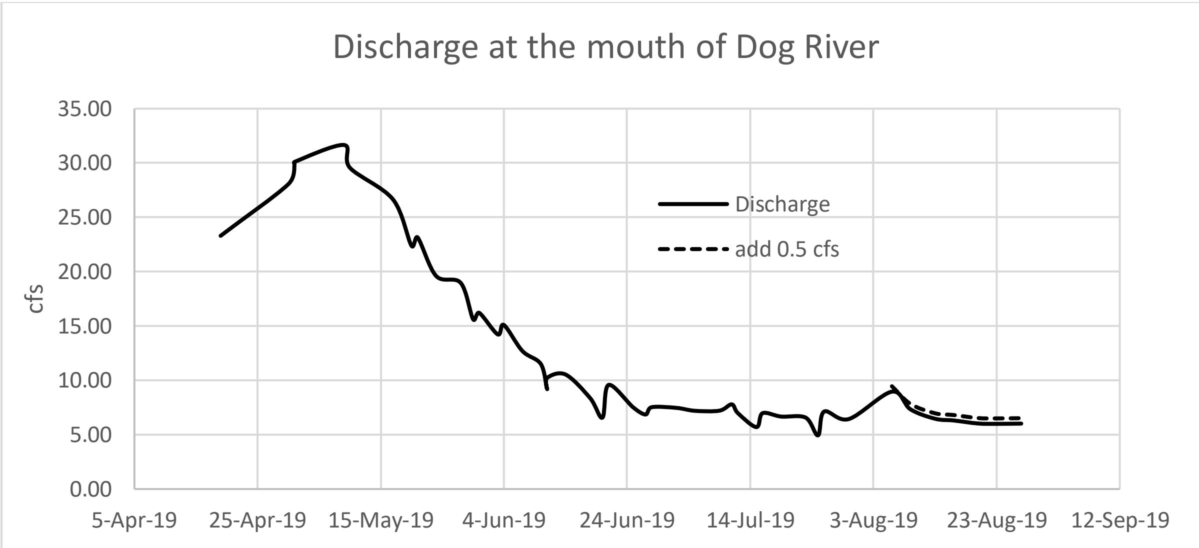
Table 30. Estimated Percent of Mean daily discharge (cfs) of Upper Dog River Diverted May through October under the Proposed Action.

	May	**June**	**July**	**August**	**September**	**October**
Percent of Dog River diverted	39	99	100	80	80	79

Source: CTD 2018

It is estimated that Puppy Creek would continue to potentially contribute on average nearly 4 percent of the base flow to lower Dog River, and Brooks Meadow Creek could potentially contribute nearly 12 percent of its base (USGS 2017). Ground water contributions to lower Dog River would also continue to supplement base flows. The perennial sources of near-bank springs and seeps along the lower reaches below the diversion would continue to provide unceasing flow during summer months.

Figure 30. Instantaneous Discharge measured near the mouth of Dog River spring through late-summer of 2019, with additional proposed bypass flow of 0.5 cfs exhibited.



When the majority of flow of upper Dog River is being diverted to the pipeline in the summer and early fall, the river at the mouth would continue to flow perennially. Despite the diversion of most of the summer low flow that's produced from the Upper catchment, as much as 40 percent or more gain of available daily flow could be expected at the mouth of Dog River (Table 31). But overall, capturing the majority of flows during summer and late fall would continue to reduce natural mean monthly base flows at the mouth of Dog River by an estimated 25 to 35 percent.

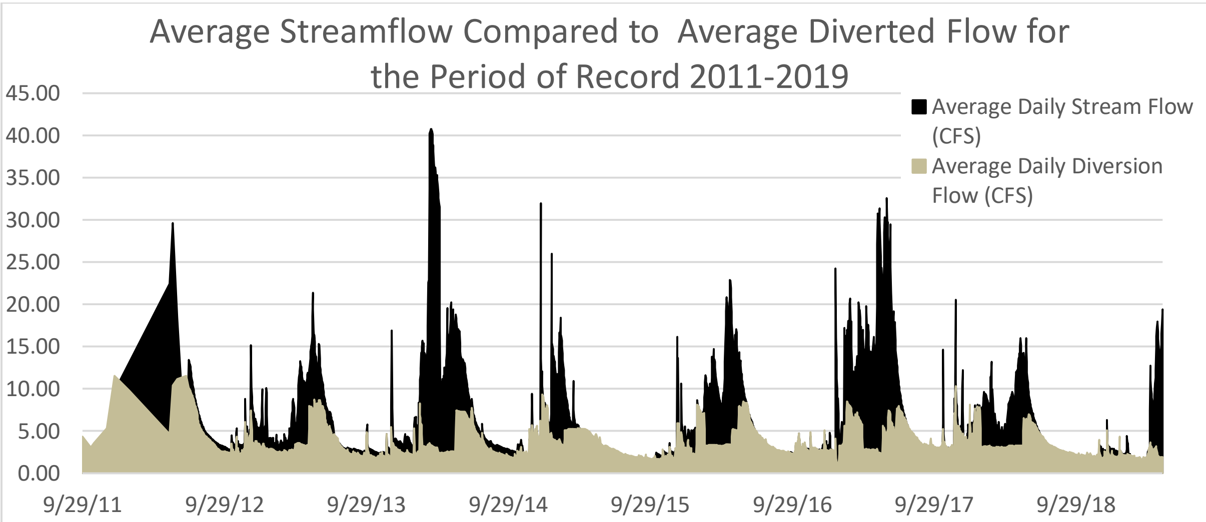
Table 31. Comparison of Discharge (cfs) in Dog River Measured Above and Below the Diversion on Select Dates.

Location	July 20, 1972	July 27, 2000	July 27, 2016	May 1, 2019
RM 6.0 Above Diversion (fully diverted flow)	6.2[1]	4.0[2]	3.2[3]	14.91[5]
RM 0.0 Near Mouth	NA	8.3[3]	5.3[4]	30.1[5]
RM 3.0 in Reach 2	9.0[1]			

Sources: [1]HRWG 1999, [2]MHF 2000b stream survey, [3]CTD 2017b, [4]CTWS 2017, [5]OWRD 2019:

The effects of diversion on peak flows would continue to be greatest during the late fall and early winter months when Crow Creek Reservoir is filling. Diversion will decrease the overall magnitude of mean daily peak flows in Dog River during that time. Data indicates it could be by as much as 70 percent in a year when total fall/winter precipitation is below normal. The majority of peak runoff however, which occurs in the spring, would not be expected to be attenuated nearly to that degree. This is because in most years, Crow Creek Reservoir would be filled by early to mid-February. Typically, the majority of the spring freshet would not be diverted, and would pass downstream to lower Dog River (Figure 31).

Figure 31. A comparison of average streamflow and diverted flow from 2011 through 2018 above the Dog River diversion to illustrate the amount of spring peak flows that would bypass to lower Dog River.

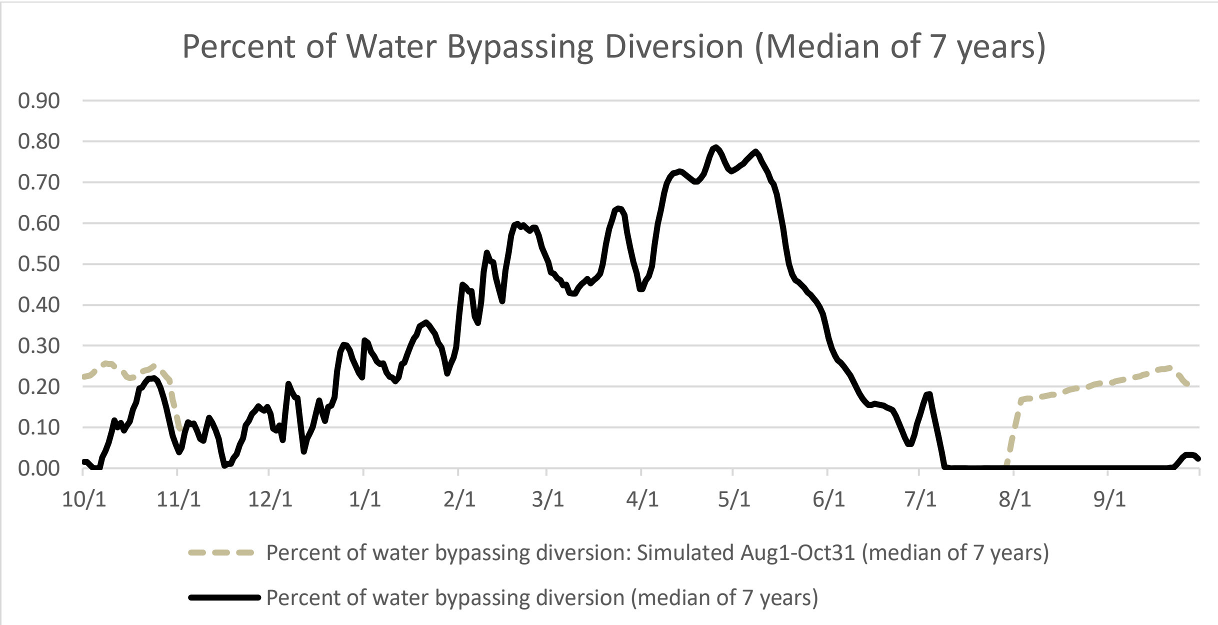


Source: CTD 2018

In lower Dog River, the attenuation of winter peak flows would be less of an effect than the upper river because of the contributions from perennial and intermittent streams in the Lower catchment. Puppy Creek for example would continue to potentially contribute on average about 19 percent of peak flow in lower Dog River, while Brooks Meadow Creek's contribution could average about 4 percent of the peak (USGS 2017).

Annually, there would continue to be an amount of bypass streamflow available to lower Dog River. Only a portion of streamflow would be diverted from upper Dog River most months. During some months bypass flows would likely be greater than diverted flows. During June and July the entire, or nearly entire amount of the flow from upper Dog River would be diverted. Bypass flows of 0.5 cfs downstream to Dog River would be maintained during the late summer and early fall only under the Proposed Action. Based on past records, the percentage of total streamflow that would not be diverted, and flow past the point of diversion and stay in the main stem of Dog River can be displayed as a percentage of total streamflow (Figure 32). The maximum amount of bypass flow would be expected to continue during late April and early May and would account for between 70 and 80 percent of the total available flow from upper Dog River.

Figure 32. The amount of mean daily streamflow that bypassed (undiverted flow) the pipeline diversion down Dog River, expressed as a percentage of total available streamflow for water years 2012 to 2018*



Source: MHNF 2018 *Includes simulated 0.5 cfs bypass flow to be offered by the City August 1 through October 31.

Installation of a new pipeline would eradicate the water loss that has persisted for many decades from the old conveyance line. The total amount of water loss would no longer factor into the amount of water diverted from Dog River to meet demand. Conveyance of water using the new pipeline would become more efficient, so that only the water needed to meet demand would be withdrawn. The amount of unused water diverted from Dog River could be minimized. Since operations that manage the timing and amount of water diverted from Dog River would change little under the Proposed Action, the amount of water loss due to leakage could become available as bypass flow downstream, or to fill Crow Creek Reservoir earlier in the winter and maintain its surface elevation longer into the spring. The water that was lost to leakage during base flows, would be available for maintaining at least 0.5 cfs bypass flow downstream to lower Dog River from August 1 to October 31.

The effects of forest management on water quantity and streamflow in the subwatershed would continue to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2015 to be below thresholds of concern (Table 32).

Since then, there has been no new road construction, and only a minor extent of past thinning. Effects of forest management on stream flow would remain negligible. There would remain however, 5 crossings over perennial streams where segments of road would periodically divert intercepted runoff toward streams, a portion of which would likely enter the stream during high runoff events. Under the Proposed Action, the one crossing where the pipeline access road intersects with Brooks Meadow Creek would be improved by installing a culvert that would diminish interception and diversion of runoff to the stream. The amount of contributing area to all five crossings would remain a very small percentage overall. Hydrologic recovery from any past activities would continue to improve.

Table 32. Road Density and Watershed Impact Areas in the Dog River Subwatershed in 2015. No changes are expected in these indicators under the Proposed Action.

Indicator	2015	Threshold of Concern
Road Density (mi/sq mi)	2.4	3.0
Watershed Impact Area (%)	3	25

Source: MHNF 2015

The mean annual contribution to the East Fork Hood River (above the confluence with Middle Fork Hood River) from Dog River would likely increase slightly above the current estimate of about 4 percent because leakage would be eradicated with the new pipeline. But overall, diversion from Dog River would continue to decrease its mean annual contribution to the East Fork by an estimated 1.5 to 2 percent.

Similar to the No Action alternative, the City would continue to move forward with ASR testing under the Proposed Action. Testing would occur on non-Forest System property under a limited license issued to them in 2018 by OWRD. Testing is not reliant on replacement of the pipeline. Water to be used for the ASR would be supplied by the surface water rights in the municipal watershed, which include Dog River, South Fork Mill Creek, and Crow Creek reservoir. In the issuance of the license OWRD estimated that existing surface flow and storage is available for the City's ASR project (OWRD 2018). OWRD would be the authority that administers the limited license agreement and enforces its terms and conditions.

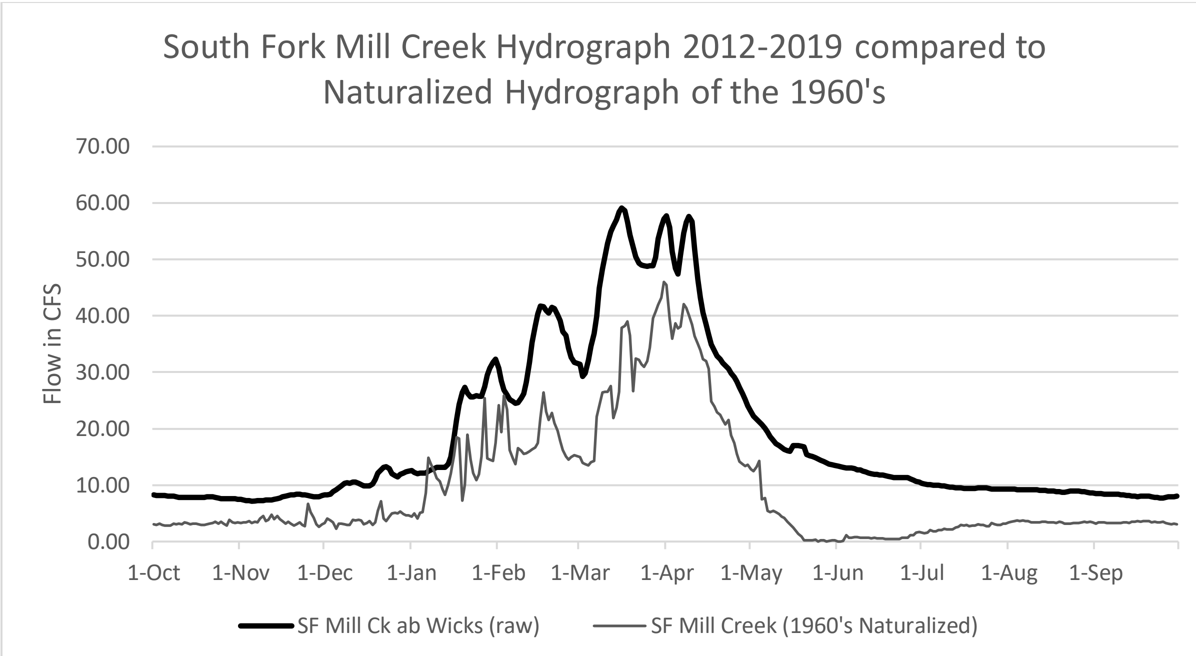
At peak demand it is estimated that ASR testing would use approximately 1.03 cfs (244 million gallons per year). This increase in demand could be expected to be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would not be a need for additional water diverted from Dog River to meet the increase in demand for ASR in most years (CTD 2019a). Due to the leakage that would be eradicated under the Proposed Action alternative, the amount of winter diversion from Dog River typically used to support storage could be available sooner, potentially filling the reservoir a week or two earlier than usual. If filled sooner, then that much more of the natural runoff from the South Fork of Mill Creek that ordinarily goes unused could be used for ASR testing.

South Fork Mill Creek

Under the Proposed Action, the amount and timing of flow diverted from Dog River to South Fork Mill Creek would continue to be managed to meet municipal demand. Operations of the Dog River pipeline and Crow Creek reservoir would capture both the naturalized streamflow from upper South Fork Mill Creek, and the diverted flow from upper Dog River until maximum storage (full-pool) would be achieved in mid- to late winter. Diverted flow would be dialed back after the reservoir becomes full so as to minimize spill while maintaining its surface elevation at full-pool. Water operations would be adjusted through the year to try and balance the capture of available flow, the quantity of diversion, storage, spill, and release with annual variation in demand.

Total streamflow in SF Mill Creek would continue to be artificially be inflated above natural conditions (Figure 33). Inflow from Dog River and storage release from the reservoir would continue to increase base and mean annual streamflow. Streamflow would still vary seasonally as it would under natural conditions, but there would continue to be more available flow overall.

Figure 33. Mean daily flow in South Fork Mill Creek above the Wicks water treatment plant intake exhibiting the estimated increase in streamflow above the natural flow regime.



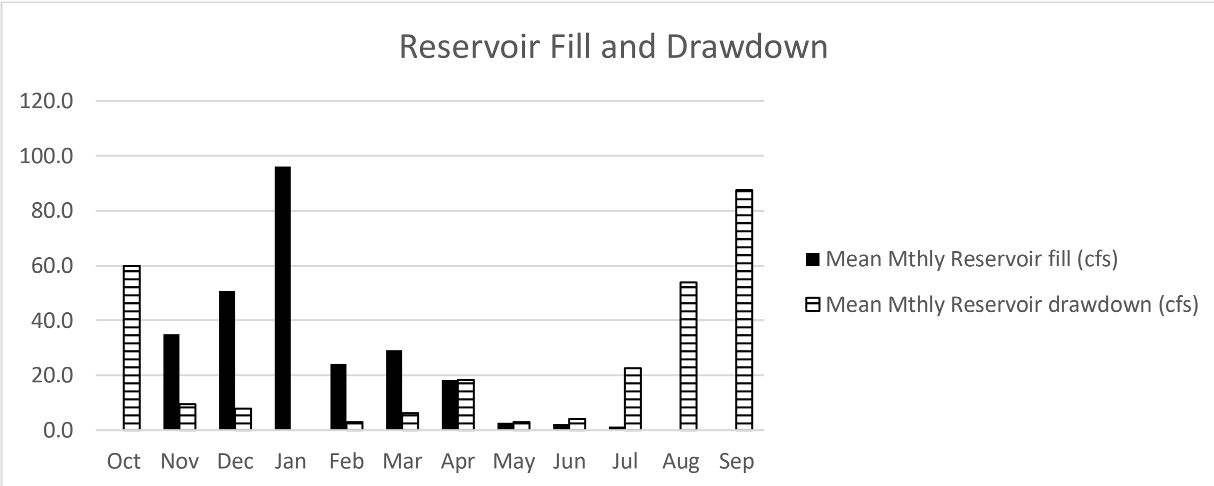
Source: CTD 2019

On average, Dog River would continue to contribute about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer would average about 7.0 cfs, and about 2.0 cfs during late summer. In Reach 2 between the pipeline outlet and Crow Creek Reservoir this contribution would amount to about 4 times more streamflow than the natural base flow. In the late fall and early winter, the amount of diverted flow would be increased to try and re-fill Crow Creek reservoir by early or mid-February. Once full, the amount of diversion would be reduced to a maintenance flow of about 2-3 cfs until mid- to late-May. Then the rate of diversion would be increased to capture the entire amount of upper Dog River's base flow through July. From August 1 through October 31, the City would reduce the amount of diverted flow to South Fork by at least 0.5 cfs.

Dam releases and diverted flow from Dog River would continue to be managed to meet peak demand during the summer months. Base flows just above the Wicks water treatment plant near the mouth of the South Fork Mill would remain elevated by more than double that of estimated natural discharge. Reliable late summer flows from these surface water sources, including available live flows and stored water releases, would remain an average estimate of 5.4 cfs (CTD 2014).

Release from the reservoir would occur year around primarily to meet municipal demand and provide at least 2.0 cfs to South Fork Mill Creek as stipulated by the reservoir Special Use Permit. Releases of 6 cfs or higher would be common. The quantity needed for release typically fluctuates on a seasonal trend, but may occur weekly or daily too. Inflow into the reservoir would begin to subside in summer, when drawdown of the reservoir would be expected to occur. Typically the City would begin drawdown in early July and then begin refilling in November (Figure 34). Sometimes there would be a need for special releases such as when one of the supplemental wells might be taken off-line.

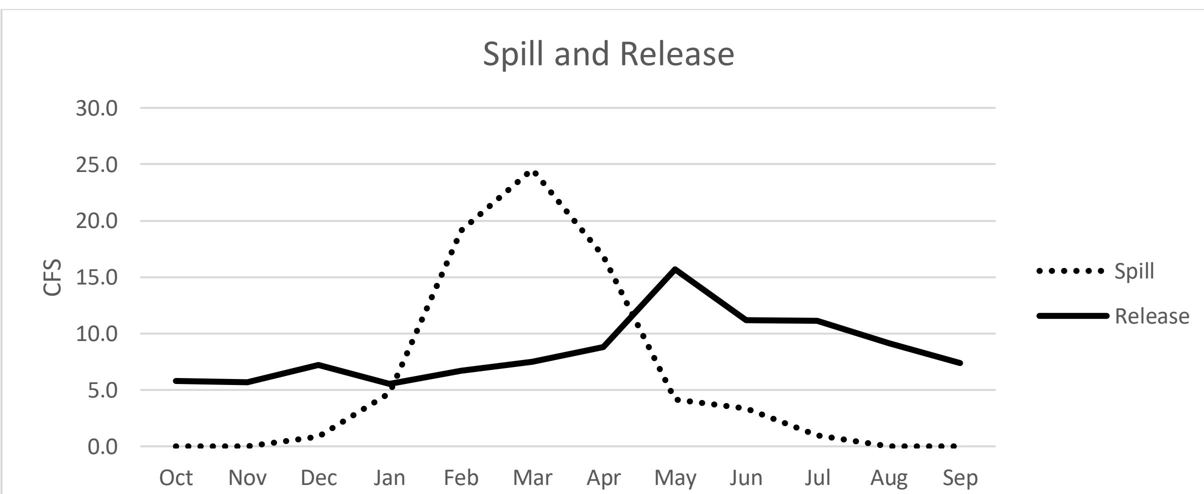
Figure 34. Mean monthly fill and drawdown trends during the period 2005 to 2015.



Source: CTD 2017c

Peak flows would continue to be attenuated to a degree below the Crow Creek dam as a result of storage in the reservoir. Spill over the reservoir however, would still occur during early spring when full-pool is exceeded because diverted flow from Dog River and natural inflow from the Upper catchment will have already filled the reservoir. Spill would continue to be greatest during the winter and spring in response to heavy runoff and precipitation (Figure 35).

Figure 35. Comparison of mean monthly spill and release during the period 2005 to 2015.



CTD 2017c. Note: Spill is not recorded continuously, so missing data has been interpreted by the graphed line.

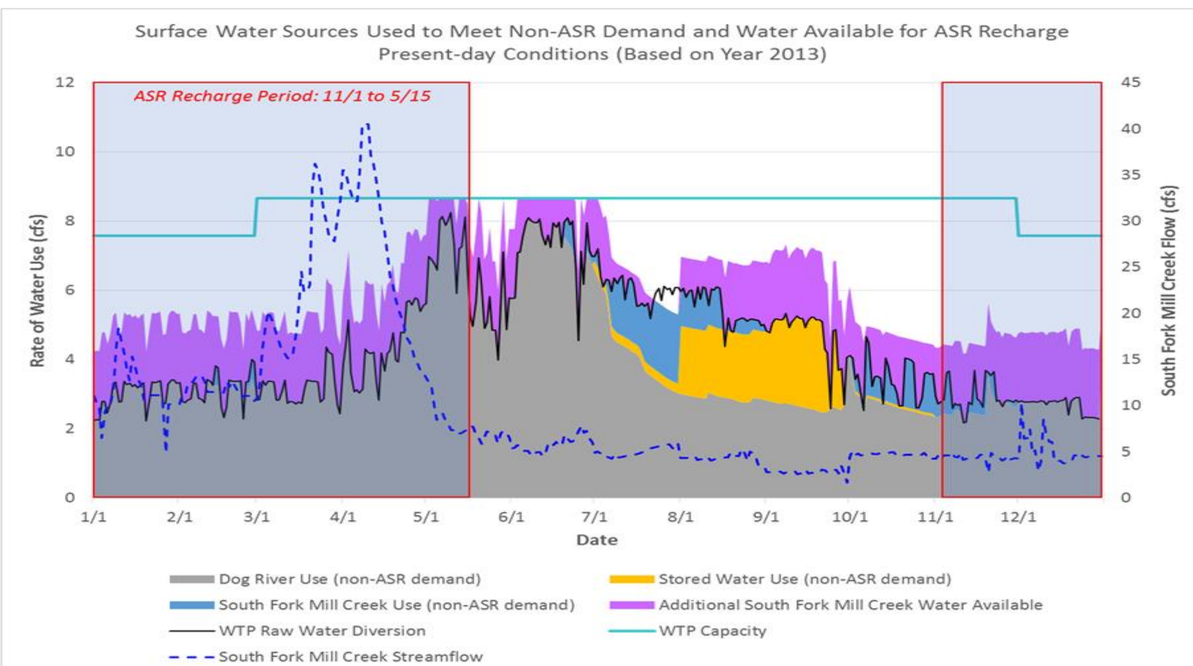
If spill occurs, then less would be needed for release. Spill would not be expected to occur during the early summer to late fall months, when demand and drawdown is highest. Spill would usually be greater than release during winter and spring, and excess to municipal use. Most of this would bypass the Wicks treatment plant intake and flow downstream to Mill Creek, elevating its average natural peak discharge.

Testing for the City's ASR system under their limited license with OWRD could be expected to utilize the spill that typically occurs during the winter and spring (Figure 36). Testing for the ASR would not be reliant on replacement of the Dog River pipeline. The increase in demand to test the ASR would be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average available spill and runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would be available water sufficient for ASR testing (OWRD 2018). OWRD would be the authority that administers the City's limited license and enforces the terms and conditions in the agreement.

The water treatment plant's average intake would be expected to increase during that time because only finished water can be used for ASR testing. This would decrease the amount of winter and spring flow that has typically bypassed the Wicks treatment plant intake and flowed to Mill Creek. This would lower the elevated average peak flow from South Fork Mill that would flow into Mill Creek by an estimated 6 percent.

Under natural flow conditions, South Fork Mill Creek is estimated to have contributed about 69 percent of the mean annual discharge of Mill Creek. Average annual diversion for the Wicks water treatment plant would continue to operate to meet demand, which has traditionally reduced the annual contribution to Mill Creek by an estimated 40 percent (OWRD 2019a). Demand for ASR testing could decrease the mean annual contribution by about another 13 percent.

Figure 36. Comparison of the proportion of the different source water supply with current and projected ASR demand.



(Note: different scale for S. Fk. Mill Creek on right-hand axis). Values above the solid black line (i.e., WTP Raw Water Diversion) represent the volume of unused water currently available for ASR testing. Source: CTD 2019a

The effects of forest management on water quantity and streamflow in the subwatershed would continue to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2012 to be below thresholds of concern (Table 33).

Since then, there has not been any new road construction on Forest Service lands. Some roads have been closed and decommissioned. The extent of ongoing fuel treatments (i.e. pile burning) would be minor. Effects of forest management on stream flow would not be expected to change under the Proposed Action, and remain negligible.

There would remain the 4 crossings over perennial streams where segments of road could periodically divert intercepted runoff toward streams, a portion of which likely enters the stream during high runoff events. But the amount of contributing area would be very small. Overall, the South Fork Mill Creek subwatershed would be considered to have minimal hydrologic disturbance from roads, and any long-lasting effects to streamflow would remain slight.

There have been about 3,829 (21%) acres of forest management activities over the last 15 years on Federal lands in and around the South Fork subwatershed. Treatments consisted of thinning, brushing, pruning, underburning, and pile burning to reduce hazardous fuels. They were intended to minimize the potential risks and impacts of wildfire. Best Management Practices were incorporated into treatment design so that watershed effects would be minimized. Existing effects of these past forest management activities, as well as past wildfire, on water quantity and streamflow in the subwatershed would remain slight and continue to diminish.

Table 33. Road Density and Watershed Impact Areas in the South Fork Mill Creek Subwatershed in 2012. No changes are expected in these indicators under the No Action alternative.

Indicator	2012	Threshold of Concern
Road Density (mi/sq mi)	2.6	3.0
Watershed Impact Area (%)	13*	25

Source: MHNF 2012, MHF 2000b *Prior to the Government Flats fire of 2013.

Channel Conditions

For the Proposed Action, channel characteristics and features would continue to be affected as a result of diverted streamflow from upper Dog River. The timing and magnitude of diverted flow would mostly continue to be managed to the status quo so that Crow Creek Reservoir would get filled by early February. Diversion would then be reduced to a flow that maintains the level of the reservoir through the spring. Then diversion would be increased to capture nearly all of the base flow through July. Then the City would maintain a bypass flow of 0.5 cfs downstream to lower Dog River from Aug 1 to October 31.

Dog River

In the Dog River subwatershed, channel forming processes would continue to be altered by the modified flow regime. Winter and summer flows would continue to be affected most. Early and mid-winter average peak flows would be attenuated to a moderate degree. But most of the streamflow volume comes from the spring snowmelt, so the majority of the spring peak flow would bypass the diversion. During June through October, the majority of the streamflow from upper Dog River would be diverted to the South Fork Mill Creek.

For most of the length of Dog River, direct access to the channel would remain limited and human perturbation other than water management would be low. The stream banks and main channel could be expected to remain primarily stable, and the sediment supply would not be expected to undergo an aberrant change from previous trends. Substrate would continue to be dominated by gravels and cobbles.

The average amount of fine sediment observed through-out all reaches would likely remain low to moderate on an area weighted basis.

Changes to channel forming processes related to modified streamflow would continue to mostly affect Reaches 1, 2, and the lower segment of 3. Effects would be greatest in the lower segment of Reach 3 immediately below the diversion because it would continue to be partially dewatered for an eighth of a mile downstream during the mid-summer (i.e., mid-June to late July). Bypass flows of 0.5 cfs that would be maintained by the City from August through October would be expected to re-water that segment of the reach, although flows in it would amount to about 20 percent of natural base flows. Overall, the reduction in average annual flow and the reduction of the majority of base flows in this reach would continue to be the cause for the diminished pool depth, width-to-depth ratio, and wetted perimeter.

Effects to the main channel in Reaches 1 and 2 that make up lower Dog River would continue to be low to moderate, primarily due to the overall reduction of mean base flows that affect the average depths of residual pools. The average depth of the primary pools in both reaches could continue to average about 2 feet during summer low flows of July, even when 100 percent of the flow of upper Dog River would be diverted. Perennial streamflow from Brooks Meadow and Puppy creeks, as well as the many near-bank springs and seeps would continue to contribute to base flows and alleviate the effects of full diversion.

The 0.5 cfs bypass flow that the City would maintain August through October would enhance somewhat base flows and pool depth. Pool depth compared to the No Action Alternative could be improved by a slightly measureable 1 to 2 inches. But overall, it is estimated that summer and early fall pool depths at the mouth of Dog River would remain on average about 2 to 3 inches more shallow than natural flow because of diversion during the base flow period.

Pool frequencies in all four reaches would be expected to remain below the LRMP and NMFS standards that are often suggested as indicators of properly functioning channel processes (Table 34). The attenuation of average peak winter flows resulting from diversion to fill Crow Creek Reservoir in the early- and mid-winter months would be a likely cause for lower pool frequencies below the diversion. The majority of pools that were observed in Reach 3 and 4 however were pocket pools, suggesting the small size of Dog River and its channel type, which have a low inherent potential for new deep pool formation because the stream power and discharge to scour deeper and mobilize larger quantities of bedload is low and infrequent.

Table 34. Observations of Select Channel Characteristics of Dog River from the 2000 Stream Survey Compared to LRMP and NMFS Standards and Guidelines.

Reach	Percent Fine Sediment Observed	LRMP Standard for Percent Fine Sediment	Total Pools per Mile	Primary Pools per Mile	LRMP Standard Primary Pools per Mile	NMFS Standard Primary Pools per Mile
1	8	20	18.8	5.2	96.7	70
2	14	20	16.6	5.1	105.2	70
3	12	20	19.5	0.6	130.5	96

4	6	20	36.5	0.0	190.1	96

Source: MHNF 2000a

Channel forming processes in Reach 4 and the remaining perennial and intermittent tributaries would remain largely unaffected. With the exception of Brooks Meadow Creek, where the pipeline access road crosses through its lower reach. It would be restored to flow through a culvert underneath the access road, providing passage for aquatic organisms and improving the functionality of this short segment. The streamflow would be free-flowing and no longer hindered.

As observed in the 2000 stream survey, the abundance and density of large woody debris in all reaches of Dog River would likely remain low to moderate compared to the LRMP standards (Table 35). But the density of LWD would continue to meet the NMFS standards in all reaches. Since then, inputs of woody debris have continued to accumulate. Small wood pieces would likely continue to dominate the total percentage of wood in the stream. Some of the small wood will remain a component of debris jams, but the majority of it would likely continue to be individual pieces. The in-stream abundance and density of woody debris would be expected to continue to gradually increase for all size classes because the potential for future recruitment from the inner riparian zone is good to excellent along most of the main stem, and the inner riparian zone for all reaches is dominated by late- and mid-seral forest structure.

Table 35. In-channel woody debris and woody debris density amounts (total of both medium and large size classes) observed in the 2000 Dog River stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	71	40	78	189	16.7	26.7	43.4	106	20
2	119	47	55	221	18.6	21.7	40.3	106	20
3	226	123	47	396	39.2	15	54.2	106	20
4	153	119	43	315	64.8	23.4	88.2	106	20

Source: MHNF 2000a

Construction along the route of the new pipeline would remove trees. The segment of the new route between the diversion and FSR 44 would be within, or on the edge of the out riparian zone. This would diminish the availability and potential recruitment of large wood taken from the construction corridor on the east side of that segment. But the inner riparian zones along both sides of the stream, and the outer zone of the west side would remain intact and undisturbed. Recruitment potential from those zones would remain high, so the overall impact of construction on recruitment of large woody debris along Reach 3 of upper Dog River would be minimal.

Data from the 2000 stream survey are useful for interpreting the effects of the modified flow regime on the potential transport, distribution, and accumulation of in-stream woody debris under the Proposed Action. There were 103 debris jams counted during the stream survey of Dog River in 2000 (Table 36). Twenty-four percent of the total wood inventoried was in these jams. Of the wood in debris jams, 47 percent was in the small size category, 31 percent in the medium size class, and 22 percent in the large size class.

Table 36. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	16	52	19	30	10	56	22
2	15	95	24	40	7	44	11
3	22	199	27	108	15	40	7
4	50	99	54	70	49	26	17

Source: MHNF 2000a

The total amount of in-stream debris jams inventoried suggests that the capability of the flows in Dog River in all reaches would continue to transport and distribute woody debris that could accumulate into jams. But intrinsically, the potential would remain fairly low because the flows and channel size are relatively small. The capability of the winter peak flows that have been attenuated by diversion to transport medium and larger pieces would remain somewhat diminished. Spring peak flows however, could be expected to retain most of their potential to transport larger pieces where the channel is wide and deep enough. Transport potential in the Lower catchment would remain higher than the Upper catchment due to greater mean channel width and depth. In lower Dog River, the potential for maximum peak flows in both winter and spring to transport and re-distribute medium and large pieces of woody debris would remain functional.

South Fork Mill Creek

Under the Proposed Action, diversion from Dog River and storage and release in Crow Creek Reservoir would continue to modify the flow regime in the South Fork Mill Creek subwatershed. Channel forming processes would remain altered as a result in the main channel. Early- and mid-winter flows, spring flows, and summer flows would continue to be affected most. Direct access to the main channel of South Fork Mill Creek would remain limited and human perturbation other than water management would be low.

Above the reservoir, average peak flows in early and mid-winter would remain elevated above naturalized levels due to contributions from diversion. Below the dam, they would be attenuated and less than naturalized rates due to the filling of the reservoir and retention for storage. Average spring peak flows would remain higher than naturalized above and below the dam because of diversion contributions and spill combined with release. Base flows above and below the dam would also remain elevated above naturalized levels due to contributions from diversion and releases downstream.

Elevating average base and peak flows will continue to increase water velocity seasonally and gradually deepen entrenchment. Width-to-depth ratios could be expected to slowly decrease, and the wetted perimeter enlarge. The short segments of channel where unstable and undercut streambanks were observed in Reaches 1 and 2 could progressively expand. For these reasons, pool abundance and quality would remain low (Table 37). Most of the segments in each of these reaches would continue to be fast flowing, and not conducive to pool formation.

Table 37. Observations of Select Channel Characteristics of South Fork Mill Creek from the 2011 Stream Survey Compared to LRMP and NMFS Standards and Guidelines.

Reach	Percent Fine Sediment Observed	LRMP Standard for Percent Fine Sediment	Total Pools per Mile	Primary Pools per Mile	LRMP Standard Primary Pools per Mile	NMFS Standard Primary Pools per Mile
1	5	20	7.9	1.4	76	70
2	23	20	6.3	0.5	115.8	96
3	11	20	0.0	0.0	NA	184

Source: MHNF 2011

Substrate would be expected to remain dominated by coarse gravel. Fine sediment generated by streambank erosion and incision would essentially be routed through the system by the elevated water velocity. Although it could continue to accumulate in the few pools or short aggrading segments in Reaches 1 and 2. Above the dam, the majority of fine sediment generated would most likely continue to settle in the reservoir, while below the dam it could accumulate behind the Wicks intake structure.

The low overall abundance and density of large wood observed in the 2011 stream survey was low, and well below LRMP and NMFS standards (Table 38). Since then, woody debris has continued to accumulate. Small wood pieces would likely continue to dominate the total percentage of wood in the stream. Some of the small wood will remain a component of debris jams, but the majority of it would likely continue to be individual pieces.

The in-stream abundance and density of woody debris would be expected to continue to gradually increase for all size classes in the Upper catchment because the potential for future recruitment from the inner riparian zone is good to excellent along most of the main stem where the inner riparian zone is dominated by late-seral forest structure. In the Lower catchment, potential recruitment is good along the main corridor of South Fork Mill Creek, but fair to poor in the outer riparian zones where the 1967 School Marm and the 2013 Government Flats fire burned over the forest. Further down, the vegetation type changes to more scrub-oak and the main stem is comprised of willows and cottonwood.

Table 38. In-channel woody debris and woody debris density amounts (total of both medium and large size classes) observed in the 2011 South Fork Mill Creek stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	77	17	3	97	5.8	1.0	6.8	106	20
2	134	37	32	203	8.7	7.5	16.2	106	20
3	10	2	1	13	5.4	2.7	8.1	106	20

Source: MHNF 2011

Data from the 2011 stream survey are useful for interpreting the effects of the modified flow regime on the potential transport, distribution, and accumulation of in-stream woody debris under the Proposed

Action. There were 129 debris jams counted during the stream survey of South Fork Mill Creek in 2011 (Table 39). Debris jams in Reaches 1 and 3 were all comprised of small wood, and 97 percent of the wood in jams in Reach 2 included small wood.

Table 39. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	32	45	32	17	0	3	0
2	90	47	87	34	3	32	0
3	7	3	7	2	0	1	0

Source: MHNF 2011

The total amount of in-stream debris jams inventoried suggests that the capability of the flows in South Fork Mill Creek in all reaches would continue to transport and distribute woody debris that could accumulate into jams. But intrinsically, the potential would remain fairly low above the dam because the channel sizes are relatively small.

The capability of the attenuated winter peak below the dam, and the capture of woody debris in the reservoir itself would continue to diminish the redistribute of woody debris through the system. The enhanced spring peak flows however would continue to be capable of transporting and re-distributing medium and larger pieces where the channel is wide and deep enough. Transport potential in the Lower catchment would remain higher than the Upper catchment due to greater mean channel width and depth.

Water Quality

For the Proposed Action, water quality would continue to be affected by diverted streamflow from upper Dog River. The timing and magnitude of diverted flow would continue to be managed close to the status quo so that Crow Creek Reservoir would get filled by early February. Diversion would then be reduced to a flow that maintains the level of the reservoir through the spring. Then diversion would be increased to capture all of the base flow through July. The City would maintain a bypass flow of 0.5 cfs from August 1 to October 31.

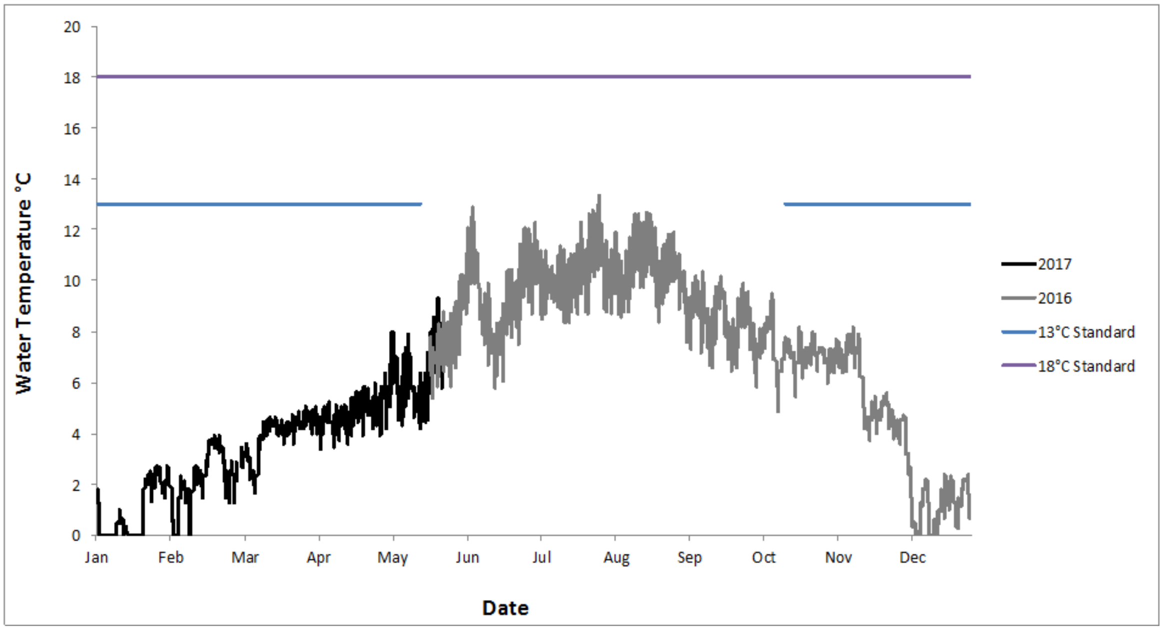
Dog River

Under the Proposed Action Alternative, only one water quality standard for the designated beneficial uses of Dog River would remain impaired. Iron would continue to exceed the standard for that constituent, keeping Dog River on ODEQ’s 303(d) list of Category 5 waters identified in their 2012 Integrated Report. It would remain a non-point contaminant because the source of the quantities detected would still be unknown. It has been surmised that iron may be naturally occurring, and its presence could be due to the geologic formations that underlie the area (ODEQ 2017c). Other impairments would not be expected to result from the Proposed Action, and no other point source or non-point source pollutants, contaminants, or water quality exceedances would be anticipated.

The seasonal trends in stream temperature observed at the mouth of Dog River would be expected to continue (Figure 37). Stream temperature would not be affected by the Proposed Action. Dog River stream temperatures would remain cold both above and below the diversion year-round, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses. Due to the presence and use by salmon and steelhead of the lowest 2.5 miles of Dog

River, and because of the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature would continue to be ongoing by the MHNF.

Figure 37. Daily average temperature data observed in Dog River upstream of the confluence of the East Fork Hood River.



Source: CTWS 2017

The potential for Dog River to provide cold-water thermal refuge for aquatic species would remain high because of the groundwater inputs from springs and wet meadows. Cold water contributions to lower Dog River from Puppy and Brooks Meadow Creeks would also continue. Dog River would remain a cold water source for the East Fork Hood River in the low flow periods of late summer and early fall, including when full diversion into the pipeline would occur upstream at RM 6.0. Lower Dog River could be expected to remain a likely location as a core cold water habitat.

Residual effects to riparian shading from past forest management would continue to be negligible in the Dog River subwatershed. Average solar radiation to the main stem and its tributaries would remain low overall, and the majority of the length of Dog River would continue to be effectively shaded. Segments of reaches where shade was lacking would remain, and include two older clearcut plantations along approximately 0.4 miles of lower Dog River where riparian vegetation had been encroached upon during the original harvest in the 1970s, and where several small patches of streamside blowdown occur in both the lower and upper reaches. Natural recovery along these segments from growing streamside vegetation would be expected to continue.

Construction of the new pipeline would result in the removal of trees along its route. The segment below the diversion to FSR 44 would mostly be within, or on the edge of the outer riparian zone. Potential shade would be removed from the construction corridor where it overlaps the out riparian zone. The inner riparian zone would remain unaffected, and continue to function as a primary source of shade. At the crossing with Brooks Meadow Creek, trees would be removed to install a culvert the stream would flow through. Tree removal at the site would occur in the inner riparian zone, diminishing shade function. But the stream would flow inside the culvert, which would provide shade. Overall, the effects of tree removal for construction of new pipeline would be nominal.

The degree of fine sediment that can potentially enter stream waters in the subwatershed would be generated from the same sources. The greatest potential would continue to come from roads at four crossings over perennial streams. The largest source would continue to be where Highway 35 crosses over lower Dog River. The potential for road grime and grit, as well as winter sanding materials to wash into the stream waters there would remain very high.

Two other crossings, where FS road 44 crosses over Dog River and where FS road 17 crosses over Brooks Meadow Creek would also remain sources of potential fine sediment. Both however, are paved crossings where use is seasonal, sporadic, and relatively low. So the amount of road grit and fine sediment potentially generated at these crossings that could enter stream water would remain relatively low.

The fourth crossing, where Brooks Meadow Creek flows across the top of gravel pipeline service road, would be restored as a result of the Proposed Action. Streamflow would be routed through a culvert underneath the road. The potential for fine sediment to enter stream waters from the crossing would be notably reduced, and it would no longer be a chronic source of fine sediment.

Construction of the new pipeline would excavate and expose soils to erosive forces for a time until the project was completed. The pipeline intake, the segment of the new pipeline route below the diversion down to FSR 44, and the segment across Brooks Meadow Creek would be the most prone locations. Erosion control practices and BMPs would be implemented to minimize the amount of fine sediment that could potentially be delivered to Dog River and Brooks Meadow Creek. The inner riparian zone would remain intact and undisturbed along the length of the segment between the diversion and Brooks Meadow Creek, buffering effects of construction. At both the diversion and Brooks Meadow Creek, construction would minimize contact with water so that any sedimentation that could occur would be short-lived and of low magnitude.

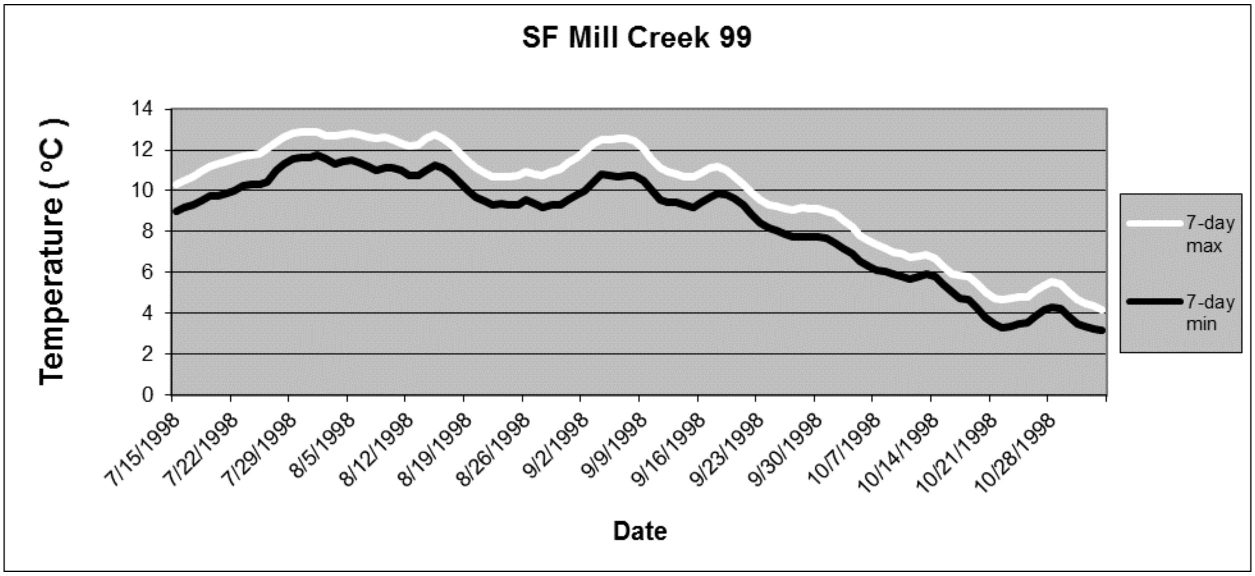
The new pipeline under the Proposed Action would eradicate the persistent water loss that leaked from the old conveyance. Surface and gully erosion would no longer result from pipeline leaks, particularly during high flows. The potential for leaks to erode flow routes and deliver fine sediment to intermittent or perennial streams would be abated. Additionally, a new pipeline would make the risk of catastrophic failure very low, diminishing considerably the potential for fine sediment and elevated turbidity to affect water quality due to a pipeline failure.

South Fork Mill Creek

Under the Proposed Action, existing effects to the water quality of South Fork Mill Creek would remain unchanged. There would continue to be no impairments to the designated beneficial uses. Other than seasonal or storm variation the quality of the stream water in the creek would be expected to remain very good. Occasionally, high concentrations of coliform could be expected to be detected by the City at the Wicks Water Treatment plant, probably originating from wildlife fecal contamination. In the past, they have also detected slightly elevated concentrations of phosphorus, possibly from accumulated sediments in the reservoir. But the dilution provided by the inflow of water from Dog River would continue to abate any effect that could necessitate special treatment.

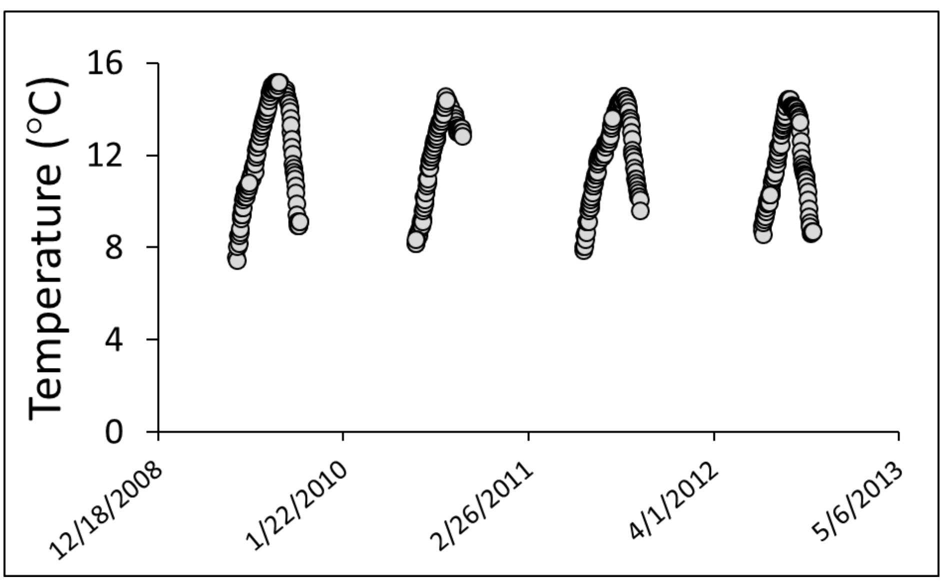
The seasonal trends in stream temperature observed below the Crow Creek Reservoir would be expected to continue (Figure 38). Stream temperature would not be affected by the Proposed Action. South Fork Mill Creek stream temperatures would remain cold year-round below the dam, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses.

Figure 38. Seven-day-minimum and maximum temperatures in South Fork Mill Creek at the USFS boundary (MHNF 1999) below Crow Creek Reservoir.



Just below the dam however, the seven-day summer maximum temperature would continue to commonly be slightly increased above the 13°C standard (Figure 39). This is thought to result when drawdown during peak use in the summer would lower reservoir levels, resulting in the potential increase of temperature in the stored water that would be released into the creek. Regardless, stream temperature would not be considered to be degrading water quality in the South Fork Mill Creek. Due to the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature by the MHNF would continue.

Figure 39. Summer average daily temperature for South Fork Mill Creek (elevation of 2,500 feet), downstream of Crow Creek Reservoir near the Forest boundary.



Source: MHNF 2017

Residual effects to riparian shading from past forest management would continue to be negligible in the South Fork Mill Creek subwatershed. Average solar radiation to the main stem and its tributaries would remain low overall, and the majority of the length of South Fork Mill Creek would continue to be effectively shaded. Segments of reaches where riparian shade had been impacted by the Government Flats wildfire would continue to recover from growing streamside vegetation.

Fine sediment and turbidity would not be expected to become an impairment to the water quality of South Fork Mill Creek under the No Action Alternative. There would remain however, existing anthropogenic sources of fine sediment in the subwatershed. The primary sources on Forest Service lands are where certain segments of road connect to the channel network at specific perennial stream crossings, and where several segments of the upper reach have become slightly more incised, and in the lower reach where there is some evidence of unstable stream banks.

Three crossings associated with FS road 1721 where it crosses over Stroud Springs, the South Fork of Mill Creek, and at Alder Creek would continue to have the potential to deliver fine sediment to stream waters. The relative amount of sediment potentially delivered from these crossings would be low because these crossings are within the Municipal Watershed, which is closed to public use and gets very little traffic. The drainage structures on this road are in good condition, and have been purposefully constructed to minimize the length of road connected to the stream network. Also, all three crossings are upstream of Crow Creek Reservoir, where road sediment would be expected to settle and accumulate

A fourth crossing is currently a bridge where FS road 1720-190 crosses the South Fork of Mill Creek about ¾ of a mile below the dam. It too is within the Municipal Watershed, and seldom used. The amount of fine sediment that it could potentially generate and deliver to the creek would also be expected to remain low.

A low-water ford located about 3.5 miles downstream of the dam on non-Federal land has the potential to generate and deliver fine sediment to the creek. But it too is seldom used. It is not always passable. Periodically, it could get used during low flow periods when it would be safe to cross over. When crossed by a motorized vehicle, it could be expected that a small measure of sediment is stirred and mobilized. The duration of the disturbance would be brief, so the amount of sediment generated would be minor and short-lived.

The hydrologic regime of the South Fork Mill Creek would continue to be altered due to the diverted flows from Dog River, the seasonal spill around Crow Creek dam, and the timed releases from the reservoir. Average peak and base flows will continue to be elevated, increasing water velocity and stream turbulence. The channel and streambanks would continue to slowly adjust incrementally. Increases in sedimentation and turbidity could be expected as a result, particularly during the spring spill and late summer releases. But since the degree of channel incision and bank erosion is not widely extensive after many decades of an altered hydrologic regime, the amount of fine sediment generated as a result would continue to remain only a slight increase.

The new pipeline under the Proposed Action would eradicate the persistent water loss that leaked from the old conveyance. Surface and gully erosion would no longer result from pipeline leaks, particularly during high flows. The potential for leaks to erode flow routes and deliver fine sediment to intermittent or perennial streams would be abated. Additionally, a new pipeline would make the risk of catastrophic failure very low, diminishing considerably the potential for fine sediment and elevated turbidity to affect water quality due to a pipeline failure.

Water Rights

The City of The Dalles would continue to use surface waters certificated by the OWRD for municipal use from Dog River and the South Fork of Mill Creek, which include the four water rights currently in their name (Table 40). The amount and designated purpose of use authorized under these existing water rights would not be expanded or transferred. The City would continue to have the right to use all of the water in upper Dog River above the point of the pipeline diversion, and 2 cfs from South Fork Mill Creek above the Wicks water treatment plant. The priority dates for these two surface water sources proceed all other claims, so they would remain senior to all other water rights from those streams. Because they are decreed and certificated municipal water rights, they will not be subject to standard forfeiture statutes, and will be protected against injurious claims (ORS 540.610 and 538.410 respectively).

Table 40. Surface Water Right Certificates for Dog River and South Fork of Mill Creek that are designated for municipal use.

City of the Dalles

Source	Application	Permit	Certificate	Claim, Decree, or Transfer	Priority date	Type of Beneficial Use	Authorized Rate or Annual Volume
Dog River			14954	Hood River decree	8/1/1870	Municipal	"All the water in stream at point of diversion"
South Fork Mill Creek			5691	Mill Creek decree	1862	Municipal	2 cfs
Crow Creek reservoir	S-43668	S-32479	60410		5/29/1967	Municipal	955 AF
South Fork Mill Creek, Dog River	R-43667	R-4988	44917		5/29/1967	Storage for Municipal	955 AF

Source: OWRDb 2019. Note: Definitions: *Permit* – Applicant has been approved to develop a water source for its designated beneficial use. *Certificate* – Applicant has "perfected" and developed the water right as per the conditions of the permit. The water right has become certified to the holder. *Decree* – Court issued water right to a holder.

These water rights would remain the purview of the OWRD, the state authority that regulates and administers their use and insures consistency with the requirements of Oregon Revised Statutes and Administrative Rules. OWRD would continue to monitor the City of the Dalles to ensure compliance with Oregon water laws pertaining to municipal use. The City of The Dalles would continue to report to OWRD their usage, proposed upgrades or changes, and provide planning documents for review consistent with the requirements and statutes for municipal water providers.

The Mt. Hood National Forest does not administer or enforce water rights. The Forest's Special Use Permits however, which authorize the City to operate and maintain the Dog River pipeline and Crow Creek Reservoir facilities located on National Forest System lands, would require that all permitted activities comply with State laws. The Mt. Hood National Forest would continue to rely on the OWRD's oversight of the City's use of water rights for compliance with the applicable State water laws.

The City would be expected to apply for an extension for their two permitted water rights slated to expire in 2021 that would provide them authorization to expand Crow Creek Reservoir, which is identified in the City's 2006 Water System Master Development Plan (permits S-53930 and R-13105). This would keep the water rights for additional storage and increased municipal use in the name of the City. It is anticipated that OWRD would grant the City a 10-year extension. If granted, it would be the second extension on each of the permits.

Priority dates for the permits are both January of 1999. Since then, only preliminary plans for raising the height of the dam have been drafted. The City has not submitted any formalized plans or filed for any other requisite approvals to prove-up on the permits so that their water rights could be certificated. Since OWRD would be expected to extend the water right permits however, reservoir expansion would remain an option if needed for the City to meet future demand. But it would remain uncertain when, or if the City intends to proceed because they would continue their search for other storage options. If they were to proceed with reservoir expansion, then NEPA would have to be initiated because the action would partially be located on National Forest System lands.

Under either Alternative, the City would be expected to exercise their limited license to conduct testing to determine the feasibility of an ASR system. The final order for the license was granted to the City by OWRD in October of 2018. The City would be authorized to divert up to 16.7 cfs using their existing water right certificates for Dog River, the South Fork of Mill Creek, and Crow Creek Reservoir. Additional diversion flow from Dog River would not be expected to meet ASR demand. OWRD would administer the City's use of the limited license, and be responsible for the enforcement of the final order's conditions.

Two other surface water rights in the Dog River and South Fork Mill Creek subwatersheds would remain held in-trust by OWRD on behalf of the ODFW (Table 41). These water rights would be administered to provide stream flow for the migration, spawning, egg incubation, fry emergence, and juvenile rearing for Coho salmon, summer and winter steelhead, rainbow trout and cutthroat trout. The flow rates allocated to them would remain applicable to the reaches of each stream below the point of diversion for the Dog River pipeline and Crow Creek dam respectively. The priority date for both instream water rights is 1991.

Table 41. In-stream surface water rights in the Dog River and South Fork Mill Creek subwatersheds and the maximum monthly allocation protected by OWRD for instream use.

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dog River below diversion Certificate IS72078A	12.0	12.0	12.0	20.0	20.0	20.0	12.0	7.01	6.05	7.79	14.7	12.0
S Fk Mill Creek below dam Certificate IS72078A	7.0	7.0	10.0	17.0	17.0	7.8	4.8	5.4	6.1	4.8	5.5	7.0

Source: OWRD 2019b

OWRD would continue to administer these instream water rights so that any remaining water available for allocation as a water right in the watershed would be designated for the in-stream purpose. These flow allocations would be the remainder of the estimated natural average flow not being used for other senior users. As described in each of the respective certificates, they would not be expected to represent minimum flow requirements. They would not guarantee actual flow availability at those rates, but rather reflect the maximum allocation protected for the instream beneficial use by the water right. As a condition of the certificate, they would not have priority over human consumption. They would be considered by OWRD to be junior to the City of The Dalles municipal water rights in Dog River and South Fork Mill Creek.

The City of The Dalles' water rights for Dog River and the South Fork of Mill Creek would remain senior to any federal reserved water rights because their priority pre-dates that of the establishment of the Mt. Hood National Forest (OWRD 2002). Any claims by the Forest Service to such rights would be subject to the state's adjudication process. The Forest Service would not be expected to submit any claims or assertion for federal reserved water rights in the Dog River and South Fork Mill subwatersheds.

3.3.2.3 Cumulative Effects

The spatial consideration of the cumulative effects for hydrology is limited to the Dog River and SF Mill Creek 12th-field subwatersheds. This was chosen because the potential for detecting measurable cumulative effects at this scale is better than at larger scales. Consideration of effects at larger scales was not assessed because the order of magnitude of the larger watershed size could potentially render any quantitative magnitude of cumulative effects inconsequential, and because the complexity of land uses at the larger scale could blur the certainty of effects attributable to an individual activity. The temporal bounds for the analysis is from the present to the foreseeable future when projects associated with existing decisions, funding, or identified proposals would be undertaken. The projects to be considered for cumulative effects are listed below in Table 42. Table 43 summarizes the cumulative effects of ongoing activities that have the potential to affect water quantity and/or quality in Dog River and/or SF Mill Creek.

Table 42. Ongoing and Future Activities Considered in the Cumulative Effects Analysis for Hydrology.

Activity	Dog River Subwatershed	South Fork Mill Subwatershed
Existing old Forest Service timber harvest units	X	X
Polallie Cooper Fuels Reduction Project	X	
The Dalles Watershed Phase I and II Fuels Reduction Project		X
Other timber harvests on federal, county, and private lands (including associated road/landing construction)		X
Forest Service road 4400 hazard tree removal	X	
Road decommissioning and road closures	X	X
Dog River pipeline and Crow Creek reservoir annual operations	X	X
National Forest system road & trail maintenance	X	X
Highway 35 highway maintenance and sanding	X	
Invasive plant treatments	X	
Trail relocations (Dog River Trail #675, Cooks Meadow Trail #639, Surveyor's Ridge Trail #688)	X	
Developed and dispersed campsites	X	X

The contribution of the Proposed Action to the cumulative effects on hydrologic resources of past and ongoing/future activities within the Dog River and SF Mill Creek watersheds would be minimal because the construction footprint is comparatively small and the duration of that activity is short-term. Construction would require the removal of existing trees along the pipeline route, the majority of which is directly adjacent to existing roads. Clearing widths for the construction corridor and staging/storage areas would amount to less than 0.01 percent of either of the subwatersheds acreage. A small portion of that disturbance footprint would occur within the upper Dog River riparian reserve near the existing intake, and trees would be removed along several hundred yards of the outer riparian zone on the east side below the diversion. The resultant increase in the extent of cumulative watershed impact areas would be nominal.

Given that both Dog River and the SF Mill are designated as Special Emphasis Watersheds in the MHNF LRMP), management actions on Forest service lands within them would remain limited both spatially and temporally. No more than 25 percent of the watershed area would be in a hydrologically disturbed condition at any time. The Special Emphasis designation and LRMP guidelines would serve as controls that limit the extent of potential impacts from ongoing or future activities within the watersheds. Additionally, none of the activities listed in Table 42 would be expected to result in large measurable effects to the existing hydrologic regime in either of the watersheds. Implementation of any activities could be presumed to employ BMPs and PDCs intended to avoid and minimize impacts to hydrologic resources.

Furthermore, pipeline operations once construction is complete would continue as they have, and the amount and timing of diverted water would be expected to remain unchanged from the current condition. Ongoing primary water operations include maintenance and monitoring of facilities, controlling and managing seasonal diversion and reservoir levels. Exploration of the feasibility of Aquifer Storage and Recovery would occur using existing available water from SF Mill Creek as per OWRD permit conditions. Standard annual road maintenance services in SF Mill Ck by the City would continue. There would not be any further removal of forest vegetation, nor any new roads. No increases in administrative activities would be expected. Changes to pipeline operations and the rate of diversion could be expected in the future to meet rising demand due to a steady increase in population, and/or shifts to the available supply of water as a result of projected climate change (cumulative effects, same as PA).

Table 43. Summary of cumulative effects on water quantity and quality resulting from past, current and future projects in the Dog River Pipeline EA action area. Only activities that have a potential for cumulative effect are addressed in this table.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
Existing old Forest Service timber harvest units	Altered peak and/or base flow	No	Yes	Not likely	Older harvest units were replanted and have been growing and naturally revegetating for at least two or more decades. Effective ground cover is essentially 100%, and the forest canopy continues to develop and mature. The mix of disconnected early- and mid-seral patches constitute a small proportion of each subwatershed. Evapotranspiration and watershed processes functioning properly.	Minimal cumulative effect throughout action area because the harvest and replanting took place long ago and regrowth has been occurring for many years.

Project	Potential Effects	Overlap in Time	Overlap in Space	Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
	Water Quality Degradation	No	Yes	Not likely	The majority of older harvest units were located away from streams and riparian zones. The few units that did encroach on riparian forest along perennial streams were replanted and have been growing and naturally revegetating for at least two or more decades. Effective ground cover is essentially 100%, and the forest canopy continues to develop and mature. Vegetation in the primary riparian zone functioning to provide shade and a mix of growing, disconnected and scattered early- and mid-seral patches for potential future wood recruitment.	Minimal cumulative effect due to relatively small amount of perennial stream impacted in riparian zones and the re-growth and vegetative development that has occurred since harvest.
Polallie Cooper Fuels Reduction Project	Altered peak and/or base flow	Yes	Yes	Not likely	Approximately 90 acres would be thinned in the Dog River subwatershed as part of the Keep Stewardship contract. None of it would be located within or near riparian areas/forest. No new roads proposed. BMPs/PDCs to avoid and minimize impacts to water quality would be employed.	Nominal cumulative effect. Thinning would affect less than 1 percent of the subwatershed area. No riparian areas/forest affected. Only existing roads would be used.
	Water Quality Degradation	Yes	Yes	Not likely		

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
The Dalles Watershed Phase I & II Fuels Reduction Project	Altered peak and/or base flow	No	Yes	Slightly possible	All projects have been completed except for some slash pile burning. BMPs/PDCs to avoid and minimize impacts to water quality were employed. All streams and riparian zones were buffered by Northwest Forest Plan Riparian Reserves. Extent of thinning acres was low, and degree of canopy reduction moderate. Stand growth and vigor ultimately enhanced. Ongoing development and growth of forest stands with greater complexity and resiliency expected.	Low cumulative effect. Total area affected by a decrease in effective canopy cover about 13 percent of the subwatershed. Buffers protect streams and riparian vegetation from effects of thinning. Only the existing road system was used. Post-harvest repairs and improvements were made to drainage features and structures.
	Degradation of Water Quality	No	Yes	Not likely		
Other timber harvests on federal, county, or private lands	Altered peak and/or base flow	No	Yes	Possible	Timber management activities have occurred, and could be expected periodically on non-Forest Service lands in the lower	Minimal cumulative effect because of small proportion of the watershed expected to be affected in any

Project	Potential Effects	Overlap in Time	Overlap in Space	Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
	Degradation of Water Quality	No	Yes	Possible	catchment of the South Fork Mill subwatershed where BLM, City and privately-owned forest industrial lands are intermixed. Oregon Forest Practices rules that buffer streams and riparian areas would be in play on non-Federal lands. Timing and extent of harvest limited by availability of merchantable stands. Currently, less than half the forested, non-Federal acreage is estimated to be available in any given decade. The need for new road construction expected to be limited to minor spurs. Road maintenance and reconstruction expected to remain minimal. Current road system connected to the drainage network at multiple locations. Drier east-side climatic conditions prevailing.	given decade. Order of magnitude estimated to be less than several hundreds of acres at any one time. Harvested areas would be re-planted within 3 years. Drinking water source area protections in play within the municipal watershed. Regrowth in previously harvested areas expected to continue and develop, and effective ground cover reestablish and be maintained.
Forest Service road 4400 hazard tree removal	Altered peak and/or base flow	Yes	Yes	None	Thinning dense thickets, and removal of hazard trees along a 100 foot-wide strip both sides of a 2-mile segment of Forest Service road	Nominal cumulative effect. Approximately 24 acres to be treated. No work in riparian zones. Minimal ground

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
	Degradation of Water Quality	Yes	Yes	None	44. Minor amount of removal of trees greater than 21 inches DBH. Lop and scatter slash. Primarily hand work. BMPs/PDCs would be employed to minimize impacts.	disturbance, nearly all hand work. Vegetation and effective ground cover would continue to grow and develop once completed.
Road Decommissioning and Closures	Altered peak and/or base flow	No	Yes	None	Road decommissioning within Dog River and SF Mill Creek has been completed. All roads within The Dalles Municipal watershed are closed to the public, with the exception of several short spurs in upper Dog River.	Nominal cumulative effect. Effective ground cover has been established on decommissioned roads, and they have stabilized. There is little to no connectivity to any water bodies. Road closures continue to limit use, which minimizes traffic generated dust or sediment.
	Degradation of Water Quality	No	Yes	None		
National Forest system road and trail maintenance activities	Altered peak and/or base flow	Yes	Yes	Not likely	Standard activities include periodic and annual inspections, removal of obstacles such as fallen trees or rocks, maintaining functional drainage features and structures, trimming encroaching vegetation, and tread repairs. Work typically occurs during the summer and fall. Wet weather activities are avoided.	Nominal cumulative effect. Work would be periodic, non-repetitive, and short-lived. The disturbance footprint would be select segments as needed. Locations could be different from year-to-year. Maintenance actions are typically intended to improve conditions, and mitigate chronic or episodic effects to hydrologic resources.
	Degradation of Water Quality	Yes	Yes	Not likely		

Project	Potential Effects	Overlap in Time	Overlap in Space	Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
Highway 35 maintenance and winter sanding	Altered peak and/or base flow	Yes	Yes	Not likely	Sanding of the highway with crushed aggregate to enhance traction for motor vehicles occurs regularly during winter months. Traffic use and snow-plowing causes sanding materials to build up to depth on the shoulder and sides of the highway. In the spring, efforts are taken to remove and recover a portion of that build-up, but an estimated one-third to half of it is unrecoverable and remains on site. A substantial proportion of the unrecoverable sanding materials that end up on the bridge over Dog River eventually get mobilized and are deposited into the water.	Cumulative impact to Dog River is considered to be at least moderate in the reach below the bridge. Changes to the river's substrate from the sanding are observable in that reach, which is a low gradient depositional channel type. The effect is limited in extent, and is an impact only to the lowest 1/8 mile of the total 10.7 miles of stream length. Sanding has been long practiced on the highway, and can be expected to continue long-term.
	Degradation of Water Quality			Likely		
Invasive Plant Treatments	Altered peak and/or base flow	Yes	Yes	No	These activities are ongoing in the NF and SF Mill Creek and were approved under a CE. BMPs/PDCs would	Cumulative effects would be slight. No treatments near water. Chemical amounts and concentrations to

Project	Potential Effects	Overlap in Time	Overlap in Space	Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
	Degradation of Water Quality	Yes	Yes	Slightly possible	be employed with any chemical application to avoid water bodies, including spill prevention and response plans. State certified applicator's license required. Treatments would be administered by hand.	be used in a single year would be low. Follow-up treatments could occur a year or two after initial application. Potential accumulations on sites with follow-up treatments would be isolated.
Trail Relocations (Dog River Trail #675, Cooks Meadow Trail #639, Surveyors Ridge Trail #688)	Altered peak and/or base flow	Yes	Yes	Not likely	The Cooks Meadow trail re-route has been completed, and most of the Surveyor's ridge reroute is also finished. The Dog River trail reroute would be expected after Keep Stewardship sale has been completed. Rerouted segments would be completed using BMPs/PDCs to minimize impacts to water, and new segments would be constructed so that the trails are disconnected with any water/streams.	Cumulative effects would be low. The potential connectivity of the re-routed segments with a water body is poor. Length of trail potentially connected to a water body is short. Drainage features and structures designed into the trail segments would be intended to disperse concentrated flow and prevent erosion of the tread.
	Degradation of Water Quality	Yes	Yes	Slightly possible		
Developed and Dispersed Campsites	Altered peak and/or base flow	Yes	No	No	There are no developed campsites in the Dog River or SF Mill Creek subwatersheds, but there would be 2 developed trailheads. Dispersed campsites are present only in the Dog River subwatershed.	Cumulative effects would be nominal. Developed trailheads are not located adjacent to any water bodies. Dispersed sites are located on ridges and on spur roads, but none are connected to water.
	Degradation of Water Quality					

3.3.3 Consistency Determination

Several key existing plans provide direction in the form of Standards and Guidelines (S&G) and recommended Best Management Practices (BMP) for planning and implementing projects. These documents include the Mt. Hood National Forest Land and Resource Plan (LRMP) (USDA 1990), and the Northwest Forest Plan (NWFP) and associated supporting documents (USDA 1994). A summary of S&G's and BMP's from these documents applicable to water quality and quantity are displayed below in Table 44. As indicated in Table 44, the Proposed Action is considered to be consistent with all of the applicabl;e S&Gs that address water quality and quantitiy.

Mt. Hood National Forest Land and Resource Plan Standards and Guidelines that Address Water Quality and Quantity:

- Consideration of BMP's – FW-54,55,56,57,58,59,60
- Analysis considerations – FW-61,62,63,64
    - Special Emphasis Watershed Allocations – FW-65,66,67
- Consideration of drinking water protection – FW-72,75,76
- Consideration of Water Use and Rights – FW-73
- Consideration of instream flows – FW-74
- Consideration of water temperature and sediment – FW-97,98,99,100,109,110,111,112,113,114,127,128,129,132,133,134,135,136

Table 44. Assessment of Consistency with Forest Plan Standards and Guidelines that Address Water Quality and Water Quantity.

S&G No.	Applicable Standards and Guideline	Consistent with S&Gs?	Comments
FW-54 to FW-60	Consideration of BMPs and compliance with Oregon State requirements (Oregon Administrative Rules, Chapter 340-41) established in accordance with the Federal Clean Water Act (1977, amended 1987)	Yes	BMPs and PDCs (project design criteria) have been developed and prescribed in the EA to prevent or minimize effects to water quality, and are consistent with the 2019 MOU with the State of Oregon DEQ.
FW-61 to FW-67	Considerations of cumulative effects and Special Emphasis Watersheds	Yes	Clearing of forest vegetation for the new pipeline would be limited in extent, and would not result in an exceedance of the Threshold of Concern for Dog River or the SF Mill Creek.
FW-72, 75, 76	Consideration of drinking water protection	Yes	Municipal water supplies are required by the State to meet safe drinking water standards. Pollution and spill prevention BMPs would be employed during construction activities, and are practices outlined in the City's

S&G No.	Applicable Standards and Guideline	Consistent with S&Gs?	Comments
			operations plans. The majority of the municipal watershed is also closed to public entry.
FW-73	Consideration of Water Use and Rights	Yes	The Forest Service has consulted with the State (OWRD) regarding the City's proposal to replace the Dog River pipeline. The Proposed Action would not violate State water law. Also, the City's water right (1870) pre-dates establishment of National Forest System lands (1908) and is senior to Federally Reserved water rights.
FW-74	Consideration of instream flows	Yes	An MOU (1972) between the City and the Mt. Hood NF designates the municipal watershed and its management objectives. Instream flow protections have been identified by the State below the Dog River diversion and Crow Creek dam. Pipeline replacement would not divert flow amounts greater than existing. Instream water rights below the diversion would not be violated. The City would provide an additional 0.5 cfs bypass flow to Dog River Aug. through October.
FW-97,98,99,100,109,110,111,112,113,114,127,128,129,132,133,134,135,136	Consideration of water temperature and sediment	Yes	The majority of the construction would be located outside of Riparian Reserves except for several key segments of the route. BMPs and PDCs would be employed during construction activities to prevent or minimize effects to water quality. Temperature and sediment have not been issues resulting from the City's operations in the past and are not expected to be future concerns with their ongoing use.

Northwest Forest Plan (NWFP) Standards and Guidelines:

- Standards and Guidelines addressing Key Watersheds (NWFP ROD pg. C-7)
- Standards and Guidelines addressing Riparian Reserves (NWFP ROD pg. C-31 through C-38)

Table 45. Consistency with Key Standards and Guidelines from the Northwest Forest Plan for Key Watersheds and Riparian Reserves.

Allocation	Applicable Standards and Guideline	Consistent with S&Gs?	Comments
Key Watersheds	• Reduce road system. No new roads • Watershed Analysis requisite • Watershed restoration emphasized	Yes	No new roads have been proposed. Unneeded roads have been identified and decommissioned in past actions. Roads in the SF Mill portion of the municipal watershed are closed to public use. Watershed Analysis was completed in 2000. Watershed restoration projects have been identified. A new culvert will replace a low water ford where the service road crosses Brooks Meadow Creek, eliminating the capture of streamflow and providing passage for aquatic organisms.
Riparian Reserves	• Roads Management	Yes	One half-mile of the 100-year old access and service road that would be used during construction is within the outer zone of a Riparian Reserve. BMPs and PDCs would be employed during construction activities to prevent or minimize effects to water quality and the riparian zone.
Riparian Reserves	• General Riparian Management	Yes	About 0.8 miles of the new pipeline would be constructed within the outer zone of the Dog River and Brooks Meadows Creeks Riparian Reserve, adjacent and parallel to the 100-year old access and service road. Included within the clearing limits of this construction corridor are many trees to be removed. The inner zone of the Riparian Reserve would remain intact and functional, providing adequate shade and potential LWD recruitment.
Riparian Reserves	• Watershed Restoration	Yes	A new culvert will replace a low water ford where the service road crosses Brooks Meadow Creek, eliminating the interception of streamflow and providing passage for aquatic organisms.

Additional Considerations for consistency with the objectives of the Aquatic Conservation Strategy in the NWFP.

- The range of Pacific Ocean anadromy does not extend into the project area, and is limited within the analysis subwatersheds by natural waterfall migration barriers in the lowest reaches of both Dog River and SF Mill Creek. So, consistency of the pipeline replacement to the ACS is not directly applicable. Replacement of the pipeline, however, is upstream within contributing areas of anadromy below, so indirectly consistency is a consideration. As such, construction of a new pipeline is not considered to be a consistency issue. Operations of the pipeline, and diversion of water into it for transfer are indirect considerations.
- Application of the NWFP and thus ACS to other contracts, permits, and special use authorizations that pre-date the ROD (1994), will be applied at the time of their renewal. The 1912 Agreement and 1972 MOU between the City and the Mt Hood NF pre-date the ROD, as does the original Special Use Permit of 1964. The City's decreed water right has a priority date of 1870 and pre-dates establishment of the Mt. Hood Nat Forest. Consistency of the City's water use and operations as authorized under a SUP would be a consideration at the time of renewal.
- Approximately ¾ of the total construction corridor for the pipeline is outside of Riparian Reserves. BMPs and PDCs to be employed during construction would be expected to avoid or minimize further effects to aquatic and hydrologic resources within and outside of Riparian Reserves. Potential effects from construction would be limited to an approximately 6-month period.
- Water use and operations by the City would not be expected to change substantially as a result of a new, larger pipeline. Water availability and instream flows downstream of the Dog River pipeline and Crow Creek reservoir would be maintained. Natural flow that is generated below the Dog River diversion, and the Wicks water treatment plant would continue to provide instream flow available to support downstream beneficial uses and TES aquatic habitat. Effects of water use and diversion on the hydrologic and sediment regime, and riparian zone function would essentially remain as they have for the last 100 plus years.

3.4 Fisheries and Aquatic Fauna

3.4.1 Existing Condition

The affected environment, also known as the action area, is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action [50 CFR §402.02]. For the purposes of this analysis, the action area includes all of the Dog River subwatershed area downstream of the point of diversion, as well as the South Fork Mill Creek drainage downstream to Crow Creek Reservoir (Figure 40). This action area includes all areas where ground disturbance would take place for the proposed activities, as well as aquatic habitat areas downstream where potential effects could occur.

The 6th field watersheds were used as the basis for the site-specific analysis summarized in this BE while the 5th field sub-watersheds were used for larger scale habitat effects analysis. Although subwatershed or drainage boundaries delineate much of the action area, the actual expected effects will only be realized in a small portion of the watershed.

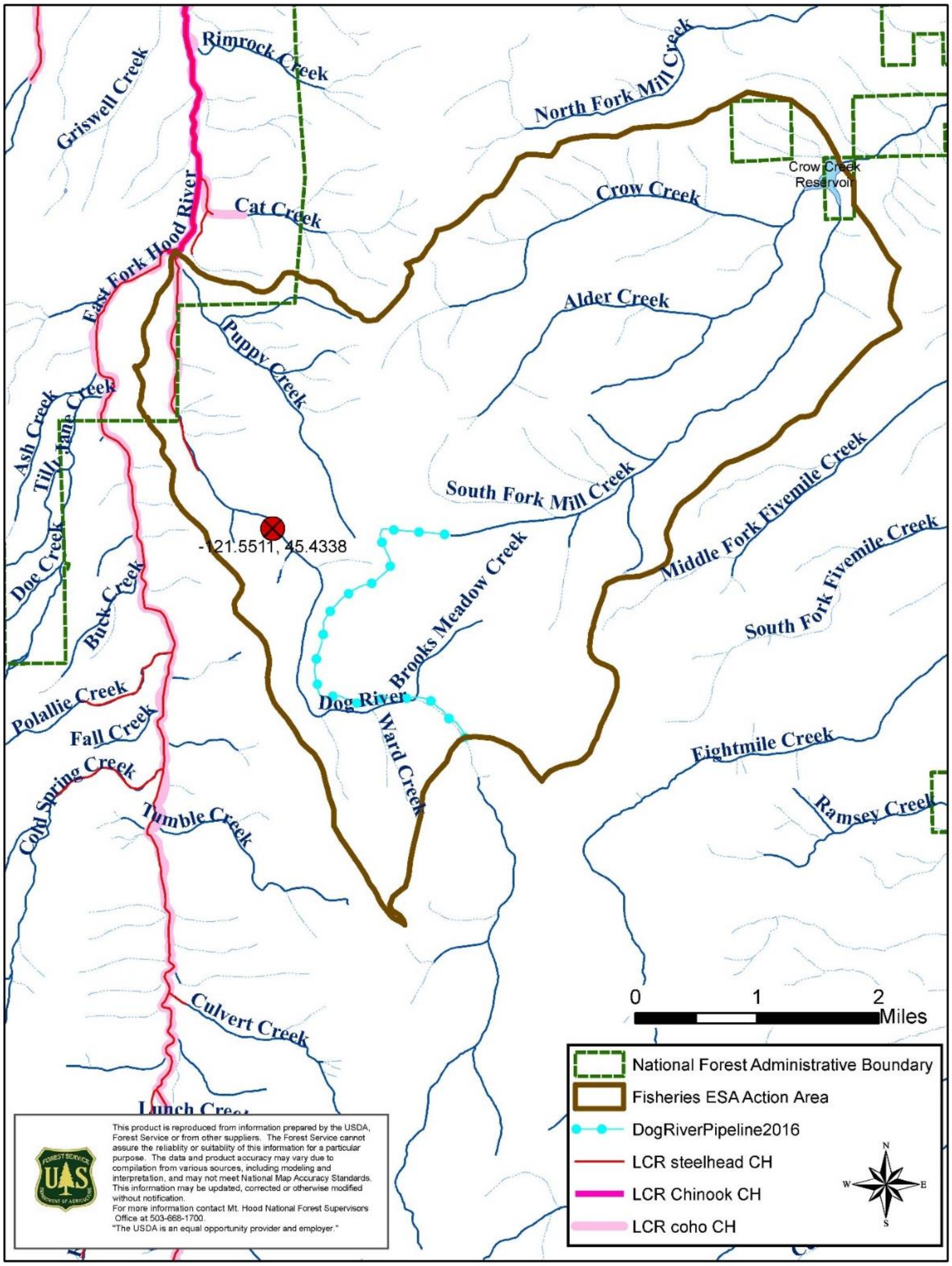
Dog River

The Dog River subwatershed comprises about 8,142 acres. The highest elevation of the subwatershed is the top of Lookout Mountain at 6,525 feet, and the lowest elevation at the mouth of Dog River at about 2,105 feet. Average precipitation in this subwatershed has historically ranged between 55 inches annually at the lowest elevation to 75 inches at the higher elevations. The hydrology of Dog River is driven by spring (groundwater) contributions during base flow periods, and by the addition of snowmelt during high flow periods, with the majority of runoff taking place in the spring and early summer (May to June). In addition, there are episodic rain-on-snow events that can cause rapid snowmelt and heavy runoff that can result in short durations of high peak flow spikes from November to February. The main perennial tributaries to Dog River are Brooks Meadow Creek and Puppy Creek. Dog River subwatershed is approximately 11 percent of the larger 5th field hydrologic unit of the East Fork Hood River (72,337 acres). Other than the lower ¼ mile, the river channel is steep with an average gradient of 7% and 11% in the 2 reaches surveyed between RM 0-5.1 (MHNF, 2000a). Base flows are supported by numerous groundwater/spring inputs. The uppermost critical habitat designation ends at RM 2.0, but for this BE, Listed Fish Habitat (LFH) is delineated to RM 2.6 at a 60' waterfall (Dog River Falls). The Oregon Department of Fish and Wildlife (ODFW) considers that, in some years, small numbers of steelhead may potentially make it up to this waterfall. The subwatershed is largely forested with subalpine fir and pacific silver fir in upper elevations, transitioning to a drier forest made up of grand fir and Douglas-fir, with a few ponderosa pine, at lower elevations (MHNF 1996).

South Fork Mill Creek

The South Fork Mill Creek subwatershed comprises about 18,240 acres. The highest elevation is about 5,050 feet on Mill Creek Buttes to about 740 feet at the confluence with North Fork Mill creek approximately 7 miles downstream from the National Forest Boundary. Average precipitation in this subwatershed has historically ranged between about 60 inches annually at the higher elevations, to 17 inches at the lowest elevations to the east. In contrast to Dog River, South Fork Mill Creek has a relatively gentle gradient that averaged 3% and 6% in the 2 reaches within the action area (MHNF, 2011). Since 1887, South Fork Mill Creek has received input from the Dog River ditch/pipeline, before flowing into Crow Creek Reservoir. Dog River pipeline contributes roughly 95% of the total annual flow to the creek (MHNF 2011). The USFS Stream survey in 2011 noted 2 very small (unnamed) tributaries on river right. Both tributaries are spring fed, with one originating from Stroud springs and the other spring unnamed. At RM 11.1, the Crow Creek Reservoir is a 28-acre impoundment at an elevation of 2,600 feet and has a maximum depth of 65 feet and a storage capacity of 267 million gallons. There are no LFH within the SF Mill Creek portion of the action area due to Mill Creek falls located at RM 3.0. The drainage is largely forested with Western hemlock, grand fir, Douglas-fir, and ponderosa pine.

Figure 40. ESA action area and extent of Critical Habitat. Note: Red dot with "x" is location of Dog River Falls and upper extent of Listed Fish Habitat.



Pipeline Operations

The City of the Dalles has an 1870 state-issued water right for all of the water in the stream at the point of the Dog River diversion. Peak reservoir fill period occurs from October to early Feb, up to capacity of pipeline (12.3 cfs). In most years, Crow Creek reservoir is filled to capacity by early Feb. In some years it is full well before that. Not all flow is diverted when filling the reservoir; there is some bypass flow during this time. Once the reservoir is full, intake is reduced (using a gate screw) to maintain flow to the reservoir that averages 3 cfs (although in winter when the headgate is not very accessible, the City lets spill over the dam until they can safely access the site). During the dry months of the year (approximately July through early November) the City diverts most of Dog River flow into the Dog River transmission pipe (RM 6.0).

Although most of the river flow is diverted during July-November, surface flows are replaced by groundwater immediately downstream of the diversion. A USFS stream survey from July 26 – August 30 of 2000 noted wetted stream channel in all areas downstream of the diversion. The discharge rate of 8.3 cfs was recorded at the mouth on July 26, 2000. Field visits in August of 2016 and September of 2019 also noted wetted channel immediately below the diversion; directly from leaking wood check boards, as well as groundwater recharge.

Land Ownership/Allocation

Most of the action area of Dog River and SF Mill Creek is within the Mt. Hood National Forest (MHNF) boundary, with the exception of portions surrounding Crow Creek Reservoir, as well as the lower 1.4 miles of Dog River. Mt. Hood Meadows has ownership from RM 0-0.7 (mouth to Hwy 35 crossing), while Hood River County has ownership from RM 0.7 to 1.4. The USFS MHNF boundary starts at Dog River RM 1.4.

On USFS lands, Northwest Forest Plan (NWFP) Land Allocation for the action area is a mixture of Late Successional Reserve, Matrix, and Riparian Reserve (Figure 3). The upper portion of Dog River (38% of the subwatershed) and all of the SF Mill drainage is designated as The Dalles Watershed Management Unit, and provides a drinking water source for the City of The Dalles. Due to the high value beneficial uses of Dog River (drinking water), it was designated as a Special Emphasis Watershed in the MHNF Land and Resource Management Plan (LRMP; MHNF 2017a).

3.4.1.1 Environmental Baseline

The environmental baseline discussion describes existing aquatic habitat conditions, particularly as they relate to designated critical habitat primary constituent elements (PCE) in the action area; and then describes Proposed, Endangered, Threatened, and Sensitive Aquatic Species within the action area. Only those species and associated habitat that are found within the action are discussed and analyzed since there would be no effect/impact to species/habitat outside the action area.

3.4.1.1.1 Existing Aquatic Habitat Conditions within the Action Area, Including Designated Critical Habitat and Essential Fish Habitat

The project area has been impacted over the past century by timber harvest, road building, floods, fires, fire suppression, municipal water diversion, and recreational activities. Separately and cumulatively, these activities have resulted in loss of function of natural processes related to water quality and quantity, riparian and floodplain function and connectivity, in-channel habitat, and obstruction free migration corridors for aquatic organisms. As a result of this project, some additional effects to those processes are possible. Project Design Criteria (PDC) have been developed to minimize those impacts.

The section below describes the current condition for habitat indicators that are used to determine attainment of the Aquatic Conservation Strategy (ACS) as outlined in the Northwest Forest Plan. Additional ACS habitat parameters and/or fluvial processes are analyzed in the Hydrology Specialist Report.

A baseline determination of functioning, functioning at risk, or not properly functioning is given to each habitat element that may be affected by the project and summarized in Table 55.

Aquatic habitat data were collected from stream surveys, water quality monitoring, queries of GIS databases, and watershed analyses. Although the surveys vary in age, all are after 1996, which was the last major flood event to dramatically change stream habitat conditions (Table 46).

Table 46. Stream Survey Data from the 2000 MHNF Dog River Stream Survey.

Reach	To River Mile	Average Wetted Width (feet)	Entrenchment Ratio	Width-to-Depth Ratio	Average Percent Gradient	Dominant Substrate	Rosgen Channel Type	Valley Form
1	1.8	14.2	2.3	15.6	7	Cobble	B3a	Narrow V-shape
2	5.1	13.2	1.5	15.4	11	Gravel	A4a+	Narrow V-shape
3	7.9	8.5	1.7	18.5	3	Gravel	B4	Trough-like open
4	9.8	4.6	2.05	14.9	10	Cobble	A3	Trough-like open

Stream Temperature

Stream temperature plays a critical role in determining metabolic rates, physiological function, and life-history of aquatic organisms as well as ecological processes such as nutrient cycling and productivity (Allen and Castillo, 2007). Aquatic species are restricted to temperature ranges that limit their distribution and available habitat. For salmonid species, there is a well-established connection between temperature and growth rate. Warmer temperatures increase feeding activity and rates of digestion, but also increase respiratory rates and energetic costs (Allen and Castillo, 2007). The Ultimate Upper Incipient Lethal Temperature (UUILT) of most salmonids falls within the range 21 to 26°C; however, multiple exposures to sub-lethal temperatures can lead to mortality (McCollough 1999). However, growth and development can be limited long before temperature approach lethal conditions. For most salmon and trout, the, preferred maximum temperatures range from 12 – 14 °C, which is close to optimal temperatures for maximum growth efficiency (Brett 1952 as cited in Groot and Margolis 1991).

From 1994-2002, stream temperature data were collected via data logger by the MHNF Hood River Ranger District at RM 0.1 (Highway 35 culvert) and is displayed in Figure 40. In addition, temperature monitoring from July 7 to October 19, 2000 was conducted as part of a USFS stream survey (MHNF 2000a) that recorded the 7-day maximum temperature remained below 13°Celsius. There are thirty-three surface water tributaries noted by the 2000 stream survey crew. All tributary temperatures were measured at midday via calibrated handheld digital thermometers for Dog River during the July 26-August 30, 2000 stream survey, with temperatures that ranged from 3-11° C. Most tributaries were 5° C or less. Dog River flow stays cold year-round due to these numerous cold-water spring contributions. A June 2017 technical memorandum from the CTWS described Dog River as potential cold-water thermal refuge for salmon species in the East Fork Hood River because of the groundwater inputs from springs and wet meadows (CTWS 2017). Results from their stream temperature monitoring near the mouth between May 2016 and May 2017 are displayed in Figure 41. That data corroborates the 7-day maximum temperature findings of the MHNF, and verifies further the cold water contribution of Dog River to the East Fork Hood River, particularly during inherent low flow periods in late summer and early fall.

Figure 41. Mt. Hood National Forest (MHNF) stream temperature monitoring data (1994-2002) in Dog River just upstream of the Highway 35 culvert (near mouth).

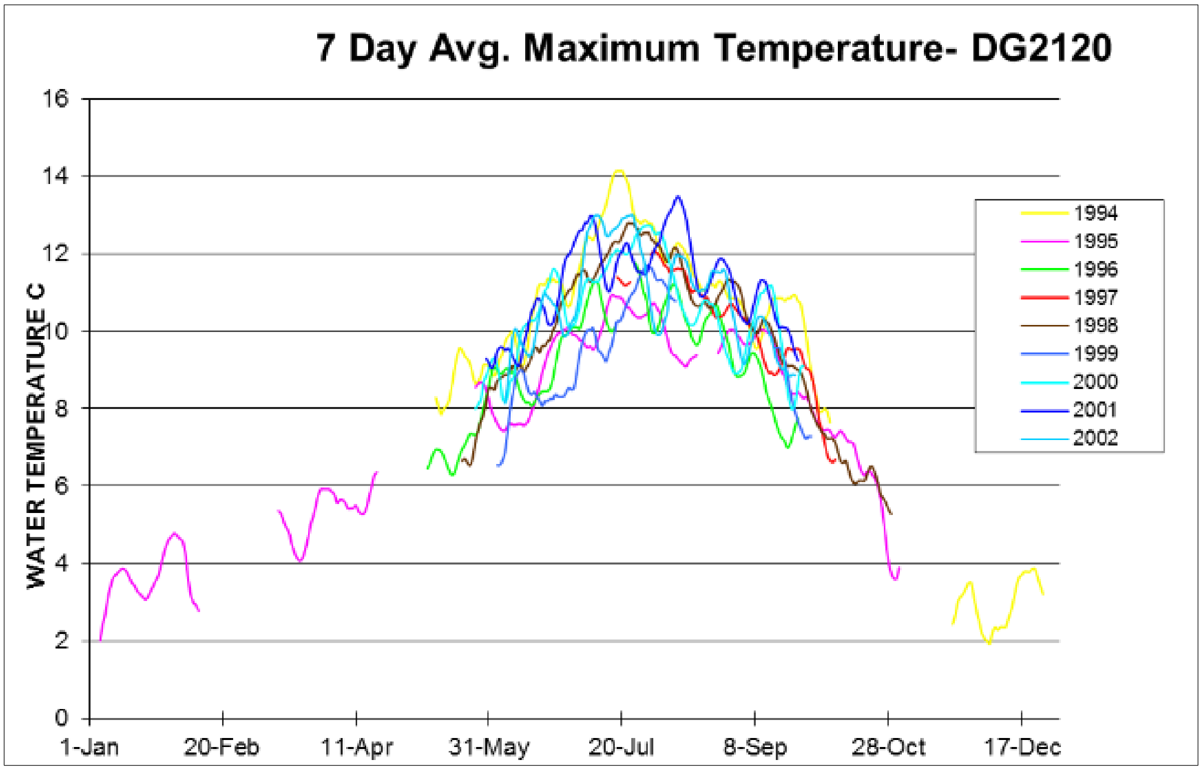
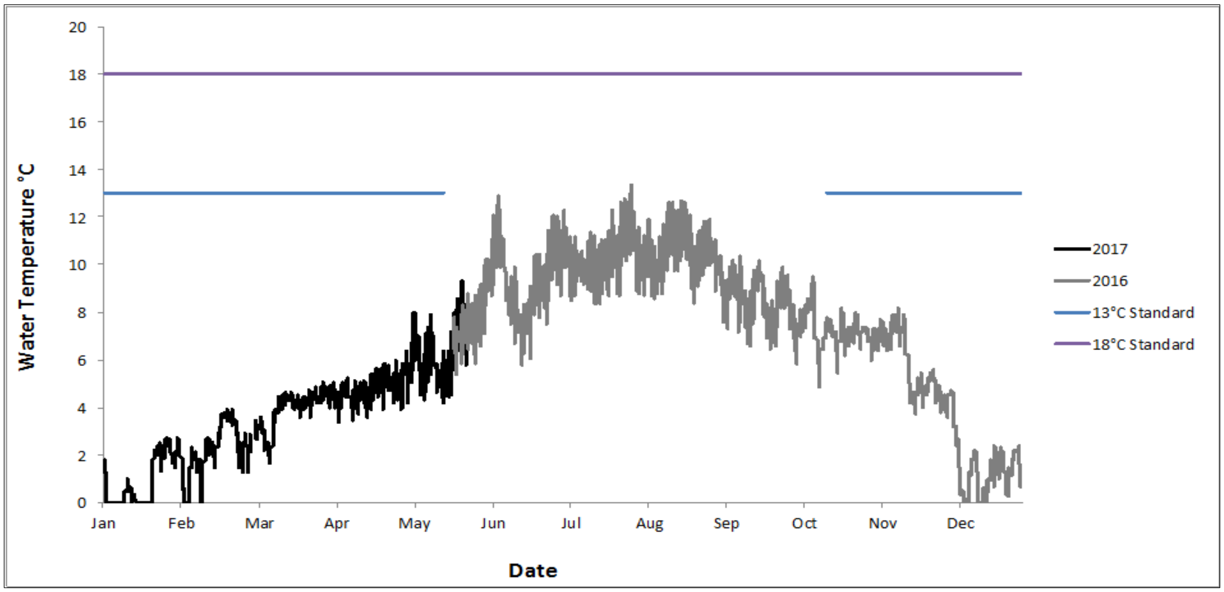
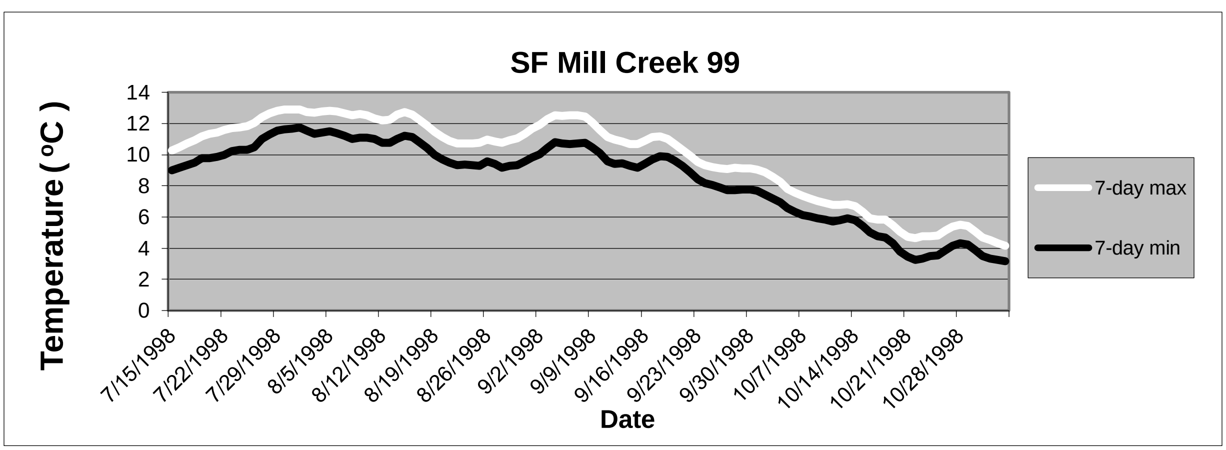


Figure 42. Daily average temperature data for Dog River upstream of the Highway 35 culvert (CTWS 2017).



A temperature data logger was installed in South Fork Mill Creek, at the USFS boundary 2.7 miles downstream of Crow Creek Reservoir (downstream of Action Area), from July 9, 1999 to November 3, 1999, by the MHNF stream survey crew (USFS 1999). Seven-day average minimum and maximum water temperatures for South Fork Mill Creek did not exceed 13^{o}C (Figure 42). Within the Action Area, handheld temperature readings were regularly taken, totaling 39 readings, as the crew surveyed from Crow Creek Reservoir to the headwaters of SF Mill Creek (5.2 miles) from September 28 to October 13 of 1999. Readings were all taken at midday. Main channel readings ranged from 4-7 ^{o}C, and 3 tributary readings varied from 5-6 ^{o}C, including the diversion input from Dog River that was classified as a tributary.

Figure 43. Seven-day-minimum and maximum temperatures in South Fork Mill Creek at the USFS boundary 2.7 miles downstream of Crow Creek Reservoir (MHNF 1999).



Sediment & Substrate Character

Fine sediment deposition and turbidity in streams can adversely affect fish and fish habitat, particularly for salmonids, by reducing the quantity and/or quality of spawning habitat; reducing food supply by impacting invertebrate habitat; reducing interstitial habitat, thereby decreasing fry survival; and reducing pool quality and quantity. Both past and on-going land use activities can contribute fine sediment in streams. The Mt. Hood National Forest Land and Resource Management Plan (forest plan) states that spawning habitat shall maintain less than 20 percent fine sediments less than 2 millimeters (FW-096).

Fine sediment levels in Dog River are low (Table 47). Substrate data from the 2000 USFS stream survey showed that small cobbles and coarse gravel are dominant in Dog River; Median particle size (D50) in the three reaches (RM 0-7.9) were 73.4 mm, 64.7 mm, and 23.4 mm.

Table 47. The percent of surface fine sediment measured by Wolman pebble counts in streams within the Dog River Pipeline Project action area.

Stream	Year Surveyed	River Miles	Percent fines <6mm	Percent fines <2mm
Dog River	2000	0.0 – 1.8	8	5
Dog River	2000	1.8 – 5.1	17	14
Dog River	2000	5.1 – 7.9	12	10

Substrate data from the 2011 USFS stream survey in South Fork Mill Creek recorded sand (<2 mm) accounted for 11-23%. Observations by FS personnel noted moderate silt levels that caused some gravel embeddedness. Coarse gravel (16-32 mm) accounted for 16-31% of the substrate. In the upper most reach, medium gravel (4-16 mm) accounted for 51% of the substrate. Small cobbles and coarse gravel are dominant in Dog River and gravel is dominant in South Fork Mill Creek. Both streams have low levels of turbidity although surface fines are slightly high (>20%) in SF Mill Creek.

Chemical Contamination/Nutrients

There are very low potential sources for chemical contamination in the Dog River and South Fork Mill Creek watersheds. Most of the upper action area is closed to entry within The Dalles Watershed Management Area. The rest of the area is largely commercial forest land, which also has seasonal recreation use. There is no agricultural or industrial land in the action area. Oregon Highway 35 is the only (paved) road that crosses LFH. This road is designed to route road surface contaminants onto vegetated areas. Therefore, chemical contamination is not a process of concern in the action area.

Physical Barriers

There are numerous natural barriers (steep gradients and waterfalls) in both the Dog River Watersheds and Mill Creek. As previously described, these waterfalls act as upstream migration barriers to anadromous fish. There are no anthropogenic barriers to ESA listed fish in the action area. However, there are several anthropogenic barriers to resident trout migration in the action area. The diversion structure at RM 6.1 is almost a complete barrier to upstream migration but does allow for downstream fish passage during higher flow periods. The culvert that passes Dog River under USFS Road 17 is classified as a year-round migration barrier. And two culverts on Brooks Meadows Creek are barriers (USFS 1710 Road crossing and USFS 4400 – 014).

Large Woody Debris

Action area streams are very close to meeting Aquatic Passage (AP) standards for >20 pieces per mile (Table 48). Recruitment potential along nearly the entire length of Dog River is considered to be good to excellent. Most of its length flows through lands administered by the Forest Service. The riparian corridor and upland slopes are heavily forested. Disturbance within the subwatershed has been very minimal, and there is an abundance of stream-adjacent large standing conifers. The upper reach of Dog River above the pipeline intake is within the designated The Dalles Watershed Management Unit, which is a protected area with limited access. Along the lower reaches of Dog River below the intake, which are outside of the watershed management area, access is also somewhat limited. There have been; however, several stands where timber had been harvested about thirty years ago. The lower margins of these two older harvest units partially encroached upon the riparian zone, though a buffer was left untouched to protect the river and its banks. This condition applies to about 4 percent of the total length of the riparian corridor. The remaining 96 percent of the corridor has been unaffected by any large-scale disturbance, and the recruitment potential for large wood is high.

In the South Fork Mill Creek subwatershed, large wood recruitment along riparian corridors is also good. These stream reaches are all within The Dalles Watershed Management Unit and located on lands administered by the Forest Service downstream to Crow Creek Reservoir. There has been timber harvest in the form of thinning and fuel reduction projects adjacent to portions of the riparian corridor within the subwatershed. Intact riparian buffers, however, have not been treated and there remains an abundant source of stream-adjacent large conifers available for potential recruitment. None of the large wood can move outside the action area into downstream LFH due to the complete barrier at Crow Creek Reservoir (and dam).

Table 48. The in stream large wood summary for surveyed streams in the Dog River Pipeline Project action area.

Stream	Year Surveyed	River Mile	Number of Pieces Medium	Number of Pieces Large	Pieces per Mile Medium	Pieces per Mile Large	Total
Dog River	2000	0.0 – 1.8	40	78	17	27	44
Dog River	2000	1.8 – 5.1	47	55	19	22	41
SF Mill Creek	2011	11.3 – 15.6	37	32	9	7	16
SF Mill Creek	2011	15.6 – 15.9	2	1	5	3	8

Pool Frequency and Quality/Large Pools

Pool habitat is a critical component of healthy stream habitat for salmonid populations. The forest plan requires that pool habitat be maintained or increased as a result of a given project (FW-088) and that streams contain one or more primary pools per five to seven channel widths in low-gradient streams (less than 3 percent slope), and one per three channel widths in steeper channels (FW-090/091). A primary pool is defined as a pool at least 3 feet deep, which occupies at least half of the low-water flow channel. Pool frequency is often related to the occurrence of large wood or other channel obstructions (Montgomery et al. 1995) and pool depth is a function of a variety of factors including sediment input and the ability of the stream at that site to scour, and maintain, a pool. Fine sediment above natural background levels can fill pools and increase bed mobility, resulting in shallower scour depths (Buffington et al. 2002).

Pool frequency in all stream reaches within the action area is below AP and Forest Plan standards (Table 49). This is less about intact riparian habitat being able to provide adequate pool-forming wood, and is rather more indicative of these small streams being transport reaches or are located in naturally riffle dominated canyons. Other than the lower ¼ mile, the Dog River channel is steep with an average gradient of 7% and 11% in the 2 reaches surveyed between RM 0-5.1 (MHNF, 2000a). South Fork Mill Creek gradient averaged 3% and 6% in the 2 reaches within the action area (MHNF, 2011).

Table 49. Pool habitat summary for surveyed streams found within the Dog River Pipeline Project action area, including total pools per mile; primary pools (pools ≥3ft. deep) per mile, and the AP standard (pools per mile).

Stream	Year Surveyed	River Miles	Total Pools per Mile	Primary Pools per Mile	AP Pools per Mile Standard
Dog River	2000	0.0 – 1.8	19	5	63
Dog River	2000	1.8 – 5.1	17	5	63
SF Mill Creek	2011	11.3 – 15.6	27	2	70
SF Mill Creek	2011	15.6 – 15.9	0	0	184

Pool quality is a descriptive measure of their suitability for fish and other aquatic fauna. Pools of higher quality are deeper and contain some form of cover for fish (i.e. large wood, undercover bank, water turbulence bubbles). Pools in the action area generally have adequate cover, temperature regime, and have not been impacted by fine sediment deposition. Adequate sources of large wood are available for both long term and short-term recruitment.

Off Channel Habitat and Floodplain Connectivity

Off channel habitat is infrequent because of the steepness of the streams in the action area. Few side channels are present in Dog River and SF Mill Creek, and they tend to be high energy habitats; there are few off-channel features such as oxbows or backwaters. Most this is a natural condition due to the confined valley form and steep gradients of Dog River and moderately confined valley for SF Mill Creek, with the exception of the area at Oregon Highway 35. The highway, at RM 0.7 constricts Dog River through a 60' double box culvert and reduces floodplain connectivity and off-channel habitat through this low gradient (1%) reach.

Refugia

Limited refugia are present within the action area for adult and juvenile spring Chinook salmon, Coho salmon, and winter steelhead. Most of this is a natural condition due to steep gradients of Dog River, with the exception of Highway 35. The highway, at RM 0.7 constricts Dog River through a 60' double box culvert and reduces complexity and refugia habitat through this low gradient (1%) reach.

Intact riparian reserves, conservation areas, ground water upwelling areas, and seeps are present and protected in the action area. Cold water year-round provides a temperature refugia for resident and anadromous fish in Dog River, although access is naturally limited due to steep gradients and waterfalls. On SF Mill, a waterfall downstream of the action area prevents any passage of anadromous species into the action area.

Width to Depth Ratio & Streambank Condition

Within the action area average bankfull width to depth (W/D) ratios ranged from 15.4 to 18.5 for Dog River and 10.1 for South Fork Mill Creek. The 2000 Dog River stream survey and 2011 SF Mill Creek survey noted very low stream bank instability that would contribute to alterations of W/D ratios from natural conditions. The watersheds have little disturbance, especially in riparian areas. The exception is at Oregon highway 35, at RM 0.7, which constricts Dog River through a 60’ double box culvert through one of the few low gradient (1%) reach accessible to anadromous fish. The channel is clearly altered permanently at this location, including W/D ratios.

The 2000 Dog River stream survey and 2011 SF Mill Creek survey noted very low stream bank instability in both watersheds.

Changes in Peak/Base Flows

The hydrology of Dog River is driven by spring (groundwater) contributions during baseflow periods, and by the addition of snowmelt during high flow periods, with the majority of runoff taking place in the spring and early summer (May to June). Downstream of the diversion, the main perennial tributaries to Dog River are Brooks Meadow Creek and Puppy Creek. Hydrological data availability for Dog River is very limited. Records exist from a historic USGS stream gage just upstream of the diversion from 1960-1971 (Figure 43) and some very limited flow data is available from both the City of The Dalles at the pipeline diversion location and from the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) just upstream of the confluence with the EFHR. Peak runoff events are often driven by rain-on-snow events and snowmelt during November to June, with 20–100 cfs peak flows recorded from 1960-1971 in Dog River just above the diversion point (USGS @ http://waterdata.usgs.gov).

Estimated D95 flows (flows that are exceeded 95% of the time, i.e., summer low flows) for Dog River above the confluence with East Fork Hood River are 8.5 cfs, 0.3 cfs for Puppy Creek (3.5% contribution), 6.5 cfs for Dog River above the Pipeline intake and 0.8 cfs for Brooks Meadow Creek (~12% contribution; Table 50; USGS 2017). D5 flows (flows that are exceeded only 5% of the time, i.e., peak spring runoff flows) for the drainage are estimated to be 96.1 cfs for Dog River at the confluence with EFHR, 17.8 cfs for Puppy Creek (~19% contribution), 35.9 cfs for Dog River above the Pipeline diversion and 4.2 cfs for Brooks Meadow Creek (~24% contribution; Table 50). A maximum recorded flow of 100 cfs was measured at the USGS gage just above the intake on May 29, 1969.

A portion of Dog River flow is diverted for municipal use by the City of The Dalles at RM 6.0 which decreases the actual D95 flows downstream of the diversion. Average stream and diversion flow data from the City of The Dalles for spring through fall of 2016 are presented in Table 51. Historically, the entire flow of the river has been diverted by The Dalles from June through October (approximately 3–10 cfs; Table 50); however, only a portion of flows from November to May (approximately 30%–70%) are diverted. Flow diversions from the spring to fall of 2016 ranged from 2.7 cfs in late September to 10.2 cfs in late May 2016 (Table 51), whereas Dog River flows ranged from 2.4 cfs in late September to 21 cfs in early May 2016. Sufficient flow to fill the pipeline is generally available in May and June, although the pipeline may only fill to capacity 8% of the time. Although nearly the entire flow of the river is diverted in the summer, surface flows are replaced by groundwater immediately downstream of the diversion. Ten tributaries enter Dog River downstream of the diversion; with 6 entering Dog River between the diversion and LFH. A USFS stream survey from July 26 – August 30 of 2000 noted wetted stream channel in all areas downstream of the diversion. The discharge rate of 8.3 cfs was recorded at the mouth on July 26, 2000.

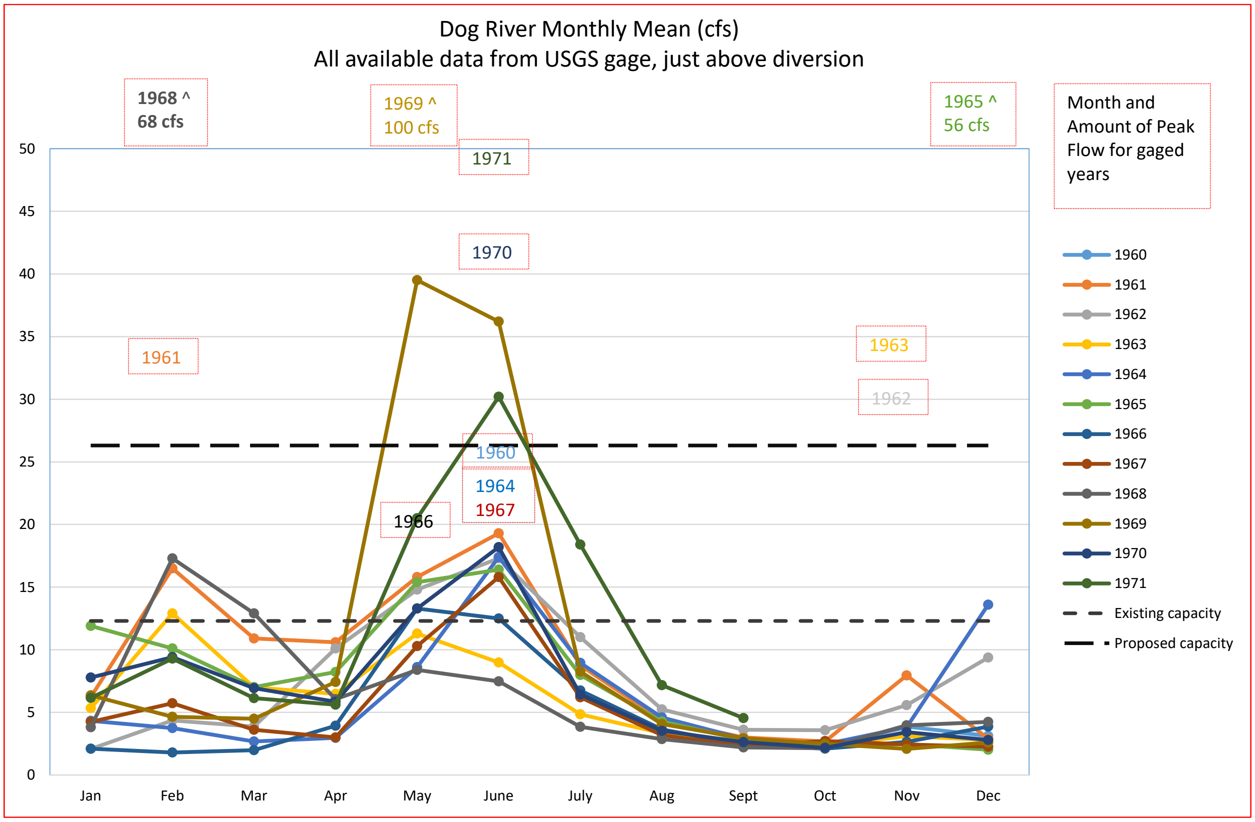
In cases when the pipeline is full in the winter and spring, roughly 1.9 cfs are thought to leak from the pipeline. Efforts to determine the flow path of the leakage have been indeterminate (MHNF 2017c). Small leaks have been observed at several sites along the pipeline, but the location of the majority of the loss is unknown.

Table 50. StreamStats Low Flow Statistics Estimates for Sites within the Dog River Watershed (values are cfs).

Site Name	D5	D50	D95
Brooks Meadow	4.2	1.3	0.8
Dog River Above Intake	35.9	11.2	6.5
Puppy Creek	17.8	2.4	0.3
Dog River at Confluence	96.1	23.6	8.5

Source: USGS (2017) Note: D5 represents the streamflow estimated to be exceeded 5% of the time, D50 represents the streamflow estimated to be exceeded 50% of the time and D95 represents the streamflow estimated to be exceeded 95% of the time.

Figure 44. Average monthly flow for Dog River immediately upstream of the Dog River Diversion, from 1961 to 1971.



Source: USGS @ http://waterdata.usgs.gov

Table 51. Monthly Average Flow for Dog River and the Dog River Pipeline.

	May	June	July	August	September	October
Dog River	15.7	7.7	4.4	3.3	2.7	3.6
Dog River Diversion	8.1	7.6	4.9	3.5	3.0	3.6
Percent of Dog River diverted	52%	99%	109%	108%	112%	99%

Note: Values for percent of Dog River diverted that exceed 100% are because of measurement variation. From June to October 2016, the entire flow of Dog River was diverted into the Dog River Diversion (City of the Dalles).

Very little flow data are available for South Fork Mill Creek. Dam release and spillway flows are available from the City of The Dalles for 2005 to 2015. Low flow statistics for South Fork Mill Creek, Crow Creek, and Alder Creek were generated with the USGS StreamStats software (Table 52; USGS 2017). South Fork Mill Creek has an estimated D95 of 0.85 cfs, and Crow Creek has an estimated D95 of 0.28 cfs, which indicates that Crow Creek would naturally contribute roughly one third of the base flow. The Dog River Diversion commonly transfers approximately 3 cfs to South Fork Mill Creek in the late summer (when D95 flows are most common) and up to approximately 10 cfs during high flow events in the winter and spring (see Figure 10 above depicting Dog River and Pipeline flows).

Table 52. StreamStats Low Flow Statistics Estimates for Sites within South Fork Mill Creek Watershed.

Site Name	D5	D50	D95
Crow Creek	48.9	2.45	0.28
Alder Creek	19.8	0.95	0.035
South Fork Mill Creek	135	6.66	0.85

Source: USGS (2017) Note: D5 represents the streamflow exceeded 5% of the time, D50 represents the streamflow exceeded 50% of the time and D95 represents the streamflow exceeded 95% of the time.

A reduction in canopy cover has the potential to influence peak/base flows. A reduction in canopy cover can reduce the volume of stream flow that is taken up by vegetation and lost to evapotranspiration. Portions of the watershed have been logged in the upper watershed; however, the trees in these patches have begun to grow back since they were harvested. Aggregate recovery percentage for Dog River subwatershed was calculated as 97.8% in 2015 (USFS, 2016). South Fork Mill Creek is part of the Dalles Municipal Watershed and is a Special Emphasis Watershed in the MHNF Land and Resource Management Plan and therefore certain management actions have been taken to safeguard the supply of domestic water to The Dalles. Management and commercial activities such as road development and timber harvest for fuels reduction have influenced the forested cover of the watershed over the years. Approximately 7% of the combined North and South Fork Mill Creek Watershed is made up of younger managed stands with less than 70% cover and an average DBH of less than 8 inches (MHNF 2017a), meaning that despite past timber harvest and wildfire the majority of the forested canopy still functions to intercept rainfall and perform evapotranspiration processes at the watershed-scale. Given the high canopy cover and low level of disturbance in the action area, it is unlikely that the action area has experienced increased baseflow or modified peak flows due to forest canopy removal.

3.4.1.1.2 Proposed, Endangered, Threatened, and Sensitive Aquatic Species within the Action Area

Fish Species Presence / Absence

Dog River, Brooks Meadow and South Fork Mill are all perennial fish-bearing streams. Maximum upper limits for ESA Listed Fish Habitat (LFH) in Dog River ends at RM 2.6, and in South Fork Mill Creek at RM 3.0; both due to natural waterfalls. Designated Critical Habitat for LCR Chinook ends at ~RM 0.1 (highway 35), LCR Coho at RM 1.4 (FS boundary), and LCR steelhead at RM 2.0. Due to the steep gradient, ODFW estimates that Coho and Chinook distribution currently ends at ~RM 0.2 (Puppy Creek confluence), while a very small number of steelhead may be able to make it all the way to Dog River Falls at RM 2.6 in optimal water years. Dog River Falls at RM 2.6 is thus considered the upper extent of Listed Fish Habitat (LFH) for this BE. Cutthroat trout are present in Brooks Meadow Creek, South Fork Mill Creek and Dog River. Coastal rainbow trout are found in lower Dog River but have not been documented above the Dog River and Brooks Meadow confluence.

Lower Columbia River (LCR) steelhead (*Oncorhynchus mykiss)* - Both LCR summer and winter steelhead runs are present in the Hood River Basin; however, only winter steelhead are present in the EFHR. Steelhead are found in the EFHR and the lower reaches of Dog River (Rod French, ODFW, personal communication, 2017) including the action area (Figure 40). Adult winter steelhead typically enter the Hood River in early December to mid-June before spawning from mid-January to late June. Most juvenile steelhead emigrate as age-2 or age-3 smolts and spend 2 years rearing in the ocean before returning as adults Winter steelhead are found in the East Fork of the Hood River and have been documented in Dog River and in the East Fork near the confluence of Dog River.

Mid-Columbia River (MCR) steelhead and their critical habitat are present in the North Fork Mill Creek and South Fork Mill Creek 6th field subwatershed but are not present in the action area. MCR Steelhead have been documented by ODFW up to Mill Creek Falls (RM 3.0) on South Fork Mill Creek, which is 8 miles downstream of Crow Creek Reservoir. Since LFH for MCR steelhead is not in the Action Area, this species will not be discussed further in this BE.

LCR Coho salmon (*O. kisutch*) - There is no artificial propagation program for Coho salmon in the Hood River Basin. Coho salmon distribution is based on limited survey information obtained from Confederated Tribes of Warm Springs and ODFW.

Coho salmon are a minority anadromous species in the Hood River compared with Chinook salmon and steelhead. The number of returning adults varies widely, averaging 243 per year but ranged from 13 to 1020 in the period 1992 - 2009, and a large proportion of the escapement is made up of hatchery strays from other river systems (Reagan 2011). The unmarked portion of the run each year is only a fraction of the entire run. For the 2009 run year, the last year Coho were trapped and counted prior to the decommissioning of Powerdale Dam (and fish passage facility), 70 natural and 563 stray hatchery Coho salmon passed upstream into the Hood River. There is no artificial propagation program for Coho salmon in the Hood River Basin.

Coho distribution in the Hood River and especially the action area is not as well understood as Chinook salmon and steelhead. Little distribution and spawning survey monitoring has focused specifically on Coho. Neither CTWS, USFS, or ODFW conduct spawning surveys specifically for Coho but spawning has been noted in the lower East Fork Hood River and some tributaries. Based on the intermittent presence of juveniles in the action area, successful spawning is occurring, likely downstream in the mainstem East Fork, as well as possibly Dog River in the action area. Spawning surveys in the action area have included the mouths of Dog River, Puppy Creek, Tilly Jane Creek, and Ash Creek. No Coho spawners were detected in 2014 in these 4 reaches, although juveniles have been noted in CTWS 2010 and 2011 snorkel surveys.

Upper limits for LCR Coho salmon ends at the Puppy Creek confluence with Dog River (RM 0.14) due to steep gradient beyond this point. Listed critical habitat for Coho salmon ends upstream in Dog River at RM 1.4, at the Forest Boundary.

LCR Chinook salmon (*O. tshawytscha*) - Chinook salmon in the Hood River basin were extirpated in the mid 1990's, and a run has been reintroduced originating from the Round Butte hatchery on the Deschutes River (CTWS and ODFW, 2000). As of 2014, the present Hood River spring-run Chinook hatchery stock is not an ESA-listed population under the ESA (FR Vol 79: 20802-20817; April 14, 2014). A final critical habitat designation was published on September 2, 2005, with an effective date of January 2, 2006, and remains unchanged at current time. Distribution and critical habitat of the LCR chinook evolutionary significant units (ESU) within the action area is shown in Figure 40. EFH in the action area is commensurate with designated critical habitat. Spring Chinook salmon are present in the action area. Fall Chinook salmon are found lower in the Hood River Basin outside of the action area.

CTWS has conducted annual spring Chinook salmon spawning surveys since 2008 (CTWS 2017). Redds have been observed in Dog River eight of the nine years monitored. While spring Chinook spawning is common in Dog River, it appears to be very restricted as all redds have been observed downstream of the Highway 35 culvert (RM 0.07).

Chinook typically enter the Hood River beginning in April and spawning commences the following August through September. Numbers of returning spring Chinook salmon adults to the Hood River averaged 500 per year and ranged from 85 to 1236 from 1992 to 2010.

Upper limits for LCR chinook and Coho salmon ends at the Puppy Creek confluence with Dog River (RM 0.14) due to steep gradient beyond this point. Designated critical habitat for Chinook salmon stops at Highway 35 crossing at RM 0.07 in Dog River (Figure 40).

3.4.1.1.3 Regional Forester's Special Status Species List - Sensitive Vertebrates and Invertebrates July 2015

As part of the NEPA process, the Forest Service reviews programs and activities to determine their potential effect on sensitive species. Only sensitive species are required to be addressed in a biological evaluation (Forest Service Manual 2670). Distribution, life history, etc. for many strategic species are poorly understood; thus when they are found while conducting surveys for other species, the Forest Service requires recording location(s) in corporate databases established by the agency.

Fish Species Presence/Absence

Pacific lamprey - Pacific lamprey are listed as a state sensitive species and a U.S. Fish and Wildlife Service Species of Concern. Upper limit data for Pacific lamprey is very limited in both the East Fork Hood River and Mill Creek 5th Field Watersheds. In general, little is known about lamprey presence in the project area or area of influence. The upper limit for Pacific lamprey is presumed to be the lower reach of Dog River below Dog River falls (Rod French, ODFW, personal communication, 2017). Upper limits for Pacific lamprey in South Fork Mill Creek is likely Mill Creek falls at RM 3.0.

Pacific lamprey migrate from freshwater streams to the Pacific Ocean, then return upstream to spawn. Typical spawning habitat is similar to that for salmon or steelhead trout, in medium- and large-sized, low-gradient Rivers and streams. Lampreys construct a nest (called a redd) in small gravel substrate. Females can lay up to 100,000 eggs, which are fertilized externally by the male. Adult lampreys die within four days of spawning. Pacific lampreys spend most of their life in freshwater streams before entering the ocean as adults to feed. Young lamprey burrow into the muddy bottoms of backwater pools and eddies, where they filter the mud and water. The juveniles, called ammocoetes, live in fresh water for up to 5 or 6 years. Juvenile lampreys are filter feeders. After a two-month metamorphosis they emerge as adults less than 5 inches long, then migrate downstream to saltwater. In the ocean they grow to 16 to 27 inches before returning after 1 or 2 years to fresh water to spawn and die. Adults are parasitic on other fish, scavenge, or are predators while in the ocean. Pacific lampreys do not feed while traveling to spawn. Pacific lampreys are vulnerable to habitat losses due to reduced river flows, water diversions, dredging, streambed scouring, channelization, inadequate protection of streamside vegetation, chemical pollution and spills, and impeded upstream passage due to dams and poorly designed road culverts.

Inland Columbia Basin Redband Trout - Inland redband trout may be present in the North Fork Mill and South Fork Mill Creek 6th field subwatershed, but are not present in the action area. Genetic analysis of salmonids from mainstem Mill Creek indicated a mixed population of inland redband and coastal cutthroat trout immediately below the confluence of the North and South Forks, predominantly redband trout. Rainbow trout identified as redband had a high frequency of the redband allele, thus it is assumed they are the inland variety (Gregg et al., 1995). Progressing downstream, coastal cutthroat trout presence dissipated giving way to a pure inland redband population. Salmonids in South Fork Mill Creek above Mill Creek Falls are cutthroat trout (USFS, 2000). Redband are not known to be present in Dog River. For this analysis, resident inland redband trout distribution is assumed to be identical to steelhead distribution in Mill Creek.

Coastal Cutthroat Trout - Coastal cutthroat trout are known to be present in Dog River up to about RM 8.5 and in Brooks Meadow Creek from its confluence with Dog River upstream to the FS road 17 crossing (RM 0.3). The FS road 17 culvert is considered to be a fish passage barrier. It is not presently known if coastal cutthroat trout are present in Brooks Meadow Creek upstream of FS road 17 crossing. However, cutthroat trout have been observed in Brooks Meadow (USFS, 1999, MHNF, unpublished data).

Coastal cutthroat trout are the only salmonids known to be present in South Fork Mill Creek above Mill Creek Falls. Forest Service personnel have observed cutthroat trout while electrofishing and made visual observation of salmonids during surveys in South Fork Mill Creek up to RM 16.3 (USFS, 1999, MHNF, unpublished data). The Dog River water transmission pipeline can entrain fish at the diversion due to the lack of a fish screen. A 2010 genetic analysis (Smith et al. 2010), conducted by MHNF, ODFW, and USFWS Abernathy Fish Technology Center, found cutthroat trout tissue samples collected in the Upper Dog River (above the Dog River diversion headgate), South Fork Mill Creek, and Crow Creek (a tributary to South Fork Mill Creek) were from the same genetic population group.

Aquatic Macroinvertebrate Presence/Absence

There are three aquatic mollusks and two caddisflies known or suspected to occur on the Forest included on the Region 6 Regional Forester's 2011 Sensitive Species list (Table 53). In addition, there are four mollusks and three caddisflies considered strategic species by the Regional Forester. Only the Dalles Juga is known to occur within the Action Area. Two of the strategic mollusks (Basalt Juga and Columbia duskysnail) were also listed as Survey and Manage Category A species requiring management of known sites and minimizing inadvertent loss of undiscovered sites (USFS and BLM 2001). For the purposes of this report/biological evaluation, the only two strategic species discussed further are the Columbia duskysnail and Basalt Juga since they are Survey and Manage species as described above.

Dalles Juga - This species of aquatic mollusk has been found in Mill Creek and the central and eastern Columbia River Gorge from Hood River to The Dalles, in Hood River and Wasco Counties, Oregon, and Skamania County, Washington (Frest and Johannes 1995). The Dalles juga is found at low elevation large springs and small-medium streams with a stable gravel substrate and fast-flowing, unpolluted, highly-oxygenated cold water. Relatively few macrophytes or epiphytic algal taxa are present, with Rorippa being the most frequently encountered. The species cannot survive long out of water (Frest and Johannes 1995).

Columbia Duskysnail and Basalt Juga - The Columbia duskysnail and Basalt Juga have been documented on the MHNF. Prior to summer of 2015 the Columbia duskysnails found on MHNF were believed to be (Colligyrus sp. nov.), but after DNA analysis was conducted in 2015 by Liu H-P, Hershler R., Rossel C (2015), specimens taken from the Dog River subwatershed (Brooks Meadow Creek), were determined to be Rocky Mountain duskysnail (Colligyrus greggi), which are not on the 2015 Regional Forester's Special Status Species List. Basalt Juga has only been found on MHNF in the North Fork Mill Creek drainage. Since these two species are Survey and Manage species rather than Special Status Species, they will not be discussed further in this document.

Table 53. Region 6 (R6) special status species either documented or suspected to occur within the Mt. Hood National Forest and within the Dog River Pipeline Project action area (Yes, No, Assumed, Unknown).

Scientific name	Common name	Forest presence	Action Area Presence Dog River	Action Area Presence Mill Creek
Sensitive Species				
Entosphenus tridentatus	Pacific lamprey	Documented	Assumed	Assumed
Onchorynchus mykiss gairdneri	Redband trout	Documented	No	Yes
Onchorynchus clarki	Coastal cutthroat trout	Documented	Yes	Yes
Juga hemphilli dallesensis	Dalles juga	Documented	Yes	Yes
Juga hemphilli	Barren juga –	Documented	No	No
Juga hemphilli maupinensis	Purple-lipped juga	Suspected	No	No
Allomyia scotti	Scott's apatanian caddisfly	Documented	No	No
Namamyia plutonis	Caddisfly (no common name)	Suspected	Unknown	Unknown
Strategic Species				
Fluminicola sp. nov. (Pinhead)	Pinhead pebblesnail	Suspected	No	No
***Juga* sp. nov. (Basalt)**	**Basalt juga**	**Documented**	**Yes**	**Yes**
Juga sp. nov. (Brown)	Brown juga	Suspected	No	No
***Lyogyrus (Colligyrus)* sp. nov.(Columbia)**	**Columbia duskysnail**	**Documented**	**Yes**	**Yes**
Pristinicola hemphilli	Pristine springsnail	Suspected	No	No
Lepania cascada	A caddisfly (no common name)	Suspected	No	No
Moselyana comosa	A caddisfly (no common name)	Suspected	No	No
Rhyacophila unipunctata	One-spot rhyacophilan caddisfly	Documented	No	No

Note: The two species in bold are also Survey and Manage species as outlined in Forest Service et al. 2001.

3.4.2 Effects Analysis

Analysis Assumptions and Methodology

This analysis utilizes research, relevant monitoring, field data, previous experience and professional judgment, as well as GIS information, to provide the context, amount, and duration of potential direct, indirect and cumulative effects on aquatic resources from the proposed project. The physical scientist reports on Hydrology provide the basis for the analysis for effects to aquatic habitat. The analysis method utilized to determine potential impact to fish, aquatic invertebrates, and their associated habitat are listed below.

1. Determine known and suspected locations of federally listed or proposed aquatic species, designated critical habitat, essential fish habitat, Region 6 Regional Forester's sensitive species and survey and manage species in relation to proposed project activities.
2. Assess proposed project activities and determine the aquatic habitat elements potentially impacted and the geographic area where effects could occur (i.e., the action area). Project activities include:
    - Abandonment of old pipeline/installation of new pipeline
    - Installation of aquatic organism passage (AOP) and pipeline crossing at Brooks Meadow Creek
    - Installation of fish screen and diversion/outlet structures
    - Temporary staging areas/material hauling
    - Pipeline operations
3. Overlap the species/habitat locations with the action area and determine which species/habitat could be affected by project activities.
4. When species/habitat overlaps with the action area, predict impacts from proposed project activities to individuals and their associated habitat. Potential effects to aquatic fauna and habitat were determined by analyzing the following:

- Direct and/or indirect effects to individuals from proposed activities;
- Potential reductions in stream shade and subsequent increases in water temperature compared to existing levels;
- Potential increases in erosion and fine sediment input to streams and wetlands compared to existing levels;
- Potential increases in chemical contaminants/nutrients;
- Presence of physical barriers;
- Potential effects to existing and future levels of large wood in stream channels and riparian reserves, including any effects on large wood recruitment; off-channel habitat and floodplain connectivity, width/depth ratio, and streambank condition; and quantity and quality of pool habitat;
- Potential effects to peak and or base flows;
- Cumulative effects associated with ongoing or proposed projects in the action area or close enough so that cumulative effects could occur.

Effects to the biological resource were determined based on professional experience, data, and literature.

Direct and Indirect Effects

Direct Effects

Direct effects are those that directly impact aquatic species/habitat. Commonly the activity needs to be in close proximity to the water body where they reside, often within the water body itself. From an aquatic perspective, direct effects most often result in disturbance to aquatic organisms—forcing movement or a flight response. Depending on the activity, it is possible that individuals can be injured or killed; this is almost always a result of people or equipment working directly in water.

In this case, the project elements that are likely to directly affect aquatic species or habitat are the additional 0.5 cfs in late summer and the culvert replacement and fish screen installation projects. These could directly affect resident fish and other sensitive aquatic organisms that are adjacent to or immediately downstream of those actions. Direct effects to resident fish species in Dog River could include a slight increase in available habitat below the diversion due to increases in late summer flow.

Direct effects could also include reduced feeding efficiency during times of increased turbidity, the possibility of individual mortality during construction, and capture of resident cutthroat trout during work area isolation.

Fish rely on sight to feed, and therefore feeding success could be hampered during those times turbidity is increased. This would be a short-term effect since turbid conditions would dissipate soon after the in-stream work phase was completed; generally in a few hours. Any time there is digging or equipment in the live stream channel there is a possibility that fish could be killed or seriously injured by being crushed or run over by equipment or materials. Because aquatic macroinvertebrates are relatively immobile, especially mollusks, it is likely such organisms would be injured or killed during construction if they are present at the site. This impact would occur at the site scale and not across the range of any aquatic macroinvertebrate species thus, the effects would be localized.

Design and engineering surveys would be conducted at the culvert crossing. When these surveys are carried out within or in close proximity to streams, harassment of fish can occur. In some instances, fish are flushed from hiding cover and can become more susceptible to predation. The disturbance typically lasts a few hours and will not have population level effects and is considered to be negligible at the 6th field and project scale.

Prior to the culvert installation, resident fish will need to be captured and removed from the project area and block nets will be installed to prevent fish movement into the project during construction. Both the capture and loss of fish passage will directly affect resident cutthroat trout. Following in-water work guidelines, and the strict adherence to applicable PDC's, would limit the direct effects on fish and aquatic mollusk species and result in negligible effects at the watershed scale.

Indirect Effects

Indirect effects are effects caused by or resulting from the proposed actions, are later in time, and are reasonably certain to occur. For example, when streamside forests are removed, an indirect effect associated with shade reduction could be an increase in water temperature. The magnitude of such an effect, if it occurred, would depend on the amount of vegetation removed, location and elevation of the stream, amount of stream flow, etc. In this case, indirect effects may affect resident trout present within close proximity to the restoration actions but have little to no effect on ESA species or LFH present farther downstream. The following analysis evaluate potential indirect effects on habitat indicators that result from the no action alternative and the proposed action alternative.

The proposed action has been stated earlier in this document. This report separates the proposed action into five project elements, which are described in detail below. Project Design Criteria have been developed for each of the project elements and can be found in Chapter 2 of the Dog River Pipeline Replacement EA.

Abandonment of Old Pipeline/Installation of New Pipeline

The primary elements of the project are the abandonment in place of the old 18" wooden pipeline and installation of the new 24" pipeline. Existing trees and dead wood will be cut and removed within the 25-foot pipeline right-of-way along the pipeline route within the pipeline service road, and at planned staging areas (Figure 47). An excavator will dig approximately a 4-foot deep by 3 to 4-foot wide trench, piling the excavated material to either side. The excavator will place the pipe in the trench and then cover the pipe section with gravel or sand and fill in the ditch with the removed material. Additional gravel or sand will be transported to the excavator by a small rubber-tired or tracked vehicle.

As water would still need to be passed to SF Mill Creek, a temporary bypass pipe would run from the end of the newly installed pipe around the active construction area to the open end of the existing pipe. The bypass pipe could consist of 8″ aluminum sprinkler-type pipe, which could be moved by hand. Two lines could run parallel for up to 500 feet. Installation of the bypass pipe would be around existing trees, logs, and rock.

It is estimated that around 438 live trees ranging in size from 6” to 48” dbh will be removed along the approximately 3.4-mile pipeline route. Of these 438 trees, roughly 12 are larger than 24” dbh, 170 are between 12” and 14” inches, and around 256 trees are 11” and smaller. In addition to the live trees approximately 198 standing dead trees would be cut. Of these, over half are between 11” and 20” inches, 22 between 20” to 30”, roughly 3 are over 30” dbh with the remainder under 11” dbh. Around 11 acres total would be affected. At its closest point, this affected Riparian Reserve area (Table 54) is about 2.7 miles upstream of Listed Fish Habitat (LFH) and 3.3 upstream of Critical Habitat (CH). This project element does not involve in-water work.

Upon project completion, all disturbed areas would be rehabilitated in a manner that results in similar or better than pre-work conditions through removal from the National Forest all of project related waste, decompaction of soil, spreading of non-vegetation stockpiled materials (soil, etc.) seeding, or planting with local native seed mixes or plants, and restoration of stream channel bed and banks. Five percent of the largest felled trees (live or dead) will be left on site, evenly distributed over the disturbed area.

Table 54. The length of proposed new pipeline in various streamside zones.

Riparian Reserve	300’ on each side of fish-bearing stream of Dog River and Brooks Meadow Creek	0.93 miles (4,900’)
1 Site Potential Tree	130’ from Dog River and Brooks Meadow Creek	0.53 miles (2,800’)
	100’ from Dog River and Brooks Meadow Creek	0.15 miles (815’)

Installation of Aquatic Organism Passage (AOP) and Pipeline Crossing at Brooks Meadow Creek

Brooks Meadow Creek is a perennial stream tributary to Dog River that is about 1 mile in length and contains resident cutthroat trout. It is located 2.8 miles upstream of LFH.

There are 2 locations for this project element, and they both involve in-water work. First, the pipeline is proposed to be buried under the channel near RM 0.1 of Brooks Meadow Creek.

Second, USFS Road 1700-014 crosses Brooks Meadow Creek at RM 0.2. The road parallels the pipeline for much of its length and provides equipment and maintenance access to the pipeline. It is currently a rough, natural surface, single lane road with an undersized culvert carrying Brooks Meadow Creek beneath. Due to its small size, the culvert has failed, resulting in Brooks Meadow Creek flooding over the road prism (Figure 48). The project would install a cement prefabricated open box culvert that will provide Aquatic Organism Passage (AOP) at all life stages and eliminate a chronic sediment source. During the culvert construction, the stream would be re-routed around the work area as the culvert is being installed. Additionally, because the existing pipeline is too fragile to handle surface vehicle traffic, the construction area would be accessed along the newly constructed section of the pipeline. It is unlikely that any mature trees will need to be removed to install the AOP culvert at the Brooks Meadow Creek crossing. Vegetation removal at the crossing will largely consist of brushing low vegetation rather than removal of mature trees.

Installation of Fish Screen and Diversion/Outlet Structures

The current diversion of water from Dog River into the existing pipeline is not equipped with a fish screen (Figure 48). This project will install a fish screen at the diversion. The proposed structure will be an in-channel screening structure that will prevent passage of resident trout into the diversion. The fish screen will meet ODFW fish screening criteria. While the fish screen is designed to work year-round, the lack of electricity at the diversion means there is no mechanism to de-ice the fish screen during winter which could result in a failure of the diversion. Therefore, the structure will be designed and constructed in a manner that will allow its removal in the winter under heavy icing conditions. The pipe inlet, flow measuring facilities, and discharge structure would also be replaced.

Temporary Staging Areas/Material Hauling

There are multiple staging areas identified for the construction period (Figure 45). None are in Riparian Reserve. A 1-acre staging area would be located at the 1700-014 road at the top of the hill west of the Brooks Meadow Creek Crossing and would accommodate the transfer of pipe from the primary storage area to the construction area. It will also act as the storage area for trees/logs removed from the corridor before they are removed from the project (Figure 45). Minor realignment of the 1700-014 road between Brooks Meadow Creek and the staging area would be completed to allow for construction vehicle traffic. There are several other locations identified for storing pipe and gravel/sand: 1) on either side of the 1700-691 where it intersects with the 1700-690; 2) along road 4400-011 at the junction with road 4400; or, 3) at an old landing off of the 1700. Gravel and sand may also be stored at the junction of the 1700 and the 1700-680 roads. All the staging areas will be rehabilitated upon completion of the project.

Roads where equipment, materials, and gravel or log hauling will occur within the action area are located outside Riparian Reserves with 3 exceptions:

- The Dog River pipeline access road (Rd 1700-014 and 4400-011), which is within 100’ of Dog River and Brooks Meadow Creek for about 815’. This native surface pipeline access road is about 2.7 miles upstream of LFH, at its closest point (3.3 upstream of CH).
- The 1700 road, which is paved, crosses Brooks Meadow Creek. This paved road crossing is about 3.1 miles upstream of LFH. Roadsides are densely vegetated at this location.
- Oregon Highway 35 near the confluence of EFHR and at Dufur Mill Road (4400) which crosses Dog River as well as several smaller streams. These road crossings do cross over LFH. Both roads are paved, have wide shoulders and good drainage.

Pipeline Operations

The new pipeline would continue to be maintained and operated as it conventionally has for many decades, conveying water diverted from upper Dog River to the South Fork of Mill Creek and stored in Crow Creek Reservoir for municipal use by the City of the Dalles (City) in accordance with existing state and federal authorizations. Current operations entail the diversion of Dog River flow year-round, including the diversion of almost all flows during the summer and early fall months. Peak reservoir fill period occurs from October to early February. Dave Anderson, City of The Dalles Public Works director for the last 12 years (and The Dalles Municipal Watershed manager for the prior 15 years), notes that in most years Crow Creek reservoir is filled to capacity by early February (personal communication). In some years it is full well before that. The City does not divert all of the stream flow when filling the reservoir. There is bypass flow during this time. Once the reservoir is full, the intake is reduced (using a screw gate) to maintain flow to the reservoir that averages around 3 cfs (although in winter when the headgate is not very accessible they let spill over Crow Creek dam until they can safely access the site). The existing operating plan allows the majority of spring peak flows to bypass the intake and continue down Dog River.

The proposed project will modify the current pipeline operations by leaving a minimum instream bypass flow of 0.5 cfs (August 1 to October 31) during a portion of the low stream flow period. The new 24" pipeline has a capacity of 26.3 cfs compared to the current pipe's capacity of 12.3 cfs.

Figure 45. Project Area including pipeline location, staging areas, and culvert replacement.

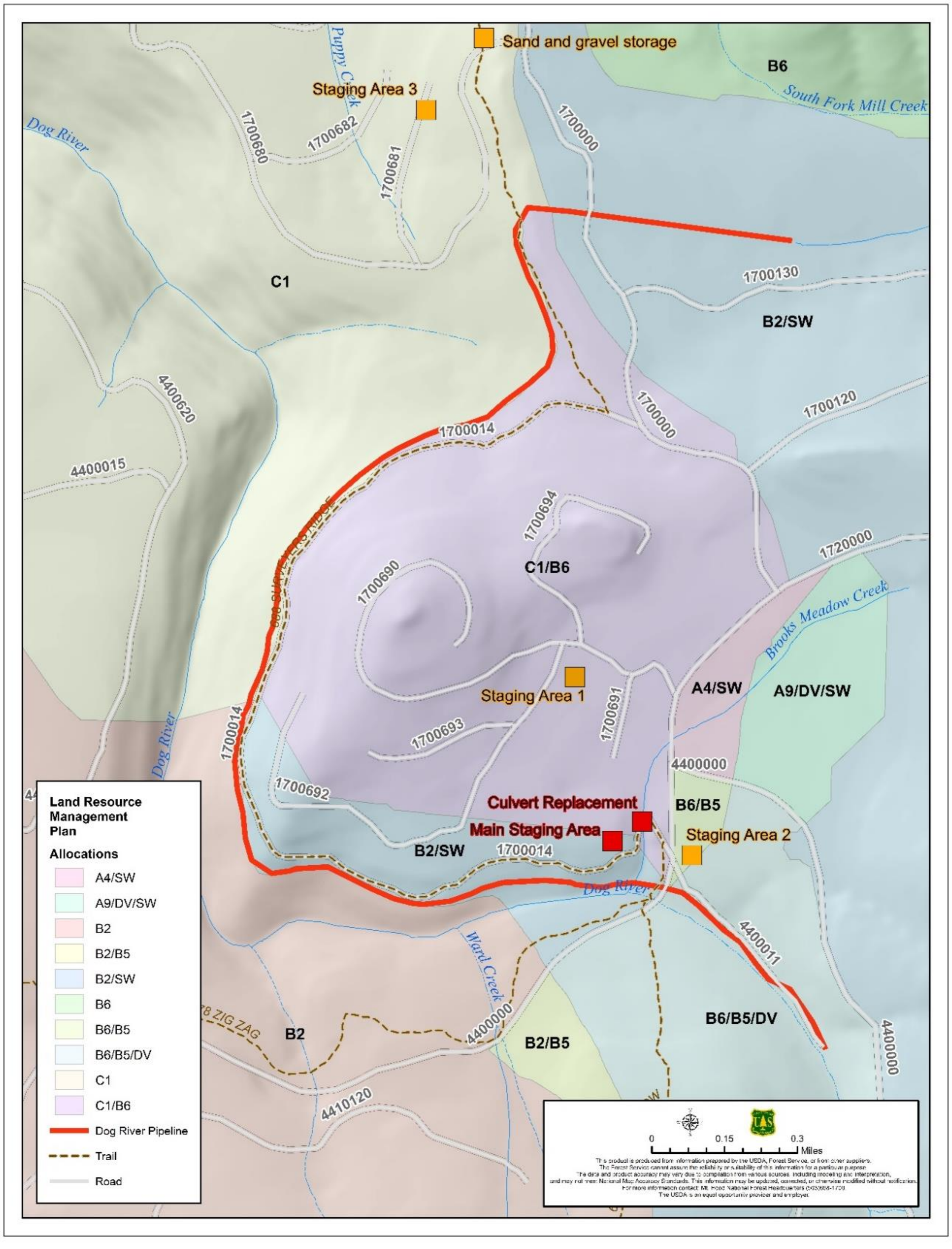


Figure 46. Top row photos: USFS Road 1700-014 road crossing ford at Brooks Meadow Creek. Middle row photos: Existing Diversion Structure on Dog River at RM 6.0. Bottom row photos: Existing Pipeline Intake at Diversion Structure on Dog River at RM 6.0.

3.4.2.1 Temperature

No Action

Stream temperature would not be affected under the No Action Alternative. The seasonal trends in stream temperature observed at the mouth of Dog River would be expected to continue. Dog River stream temperatures would remain cold both above and below the diversion year-round, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses (Hydrologist Specialist Report). Under the No Action Alternative, existing effects to the water quality of South Fork Mill Creek would remain unchanged. There would continue to be no impairments to the designated beneficial uses

Proposed Action - Abandonment of Old Pipeline/Installation of New Pipeline

The primary elements of the project that could alter stream temperature are the abandonment in place of the old 18" wooden pipeline and installation of the new 24" pipeline. Existing trees and dead wood will be cut and removed within the 25-foot pipeline right-of-way along the pipeline route within the pipeline service road. It is estimated that less than 600 trees total will be removed along the 3.6-mile pipeline route. Around 11 acres total would be affected. This project element does not involve in-water work. At its closest point, this affected Riparian Reserve area is about 2.7 miles upstream of Listed Fish Habitat (LFH), and 3.3 miles upstream of CH, in Dog River.

Tree falling outside of 1 Site Potential Tree height (130') has no causal mechanism to affect stream shading that would affect water temperature, thus tree falling in 2.92 out of the total 3.6 mile pipeline will have a **neutral** effect on water temperature.

Tree falling to replace the diversion outlet in headwaters of SF Mill Creek has no possibility of affecting LFH because of the pronounced distance (>11 miles from pipeline outlet to LFH), and more significantly, the juxtaposition of an impoundment (28-acre Crow Creek reservoir/dam) that disconnects potential project impacts from LFH.

Tree removal within a site potential tree height has the potential to affect stream temperature through removal of tree canopy that provides shade to streams. Approximately 0.68 miles (3,615') of pipeline road will have trees removed within this zone of Dog River and the mouth of Brooks Meadow Creek.

The removal of trees in this zone will have a **discountable** effect to resident cutthroat trout and a **discountable** effect to stream temperature in LFH due to the following:

- 0.3 miles out of the 0.68 miles pipeline opening is only on the north side of the stream. Little stream shading is provided by trees on the north bank.
- A very small amount (815') of pipeline is within 100' (of one side) of the stream. The majority of the pipeline that is 100-130' away from the stream will have additional shading provided by 100' of undisturbed over story trees, understory hardwoods, and streamside shrubs.
- At its closest point, this affected riparian area is about 2.7 miles upstream of Listed Fish Habitat (LFH), and there are 6 cold water tributaries between this point and LFH (tributaries contributed 4.5-10 ^{o}C flow when recorded during August 2000).
- The riparian corridor is intact and densely forested the entire length from the diversion to LFH.

Proposed Action - Installation of AOP and Pipeline Crossing at Brooks Meadow Creek

Brooks Meadow Creek is a small (<1 cfs during summer) spring-fed stream that stays cold year-round. A 2000 USFS stream survey measured the mouth at 10 ºC in early August, and field visits in summer of 2016 confirm the very cold stream temperatures in the portion that runs through Brooks Meadow.

It is unlikely that any mature trees will need to be removed to install the AOP culvert at the Brooks Meadow Creek crossing. Vegetation removal at the crossing will largely consist of brushing low vegetation rather than removal of mature trees. A few trees will likely be removed to allow for the pipeline to cross under Brooks Meadow Creek, with a clearing width of 25 feet perpendicular to the creek.

The pipeline crossing is approximately 2.9 miles upstream of LFH, with the AOP installation at approximately 3.0 miles upstream of LFH. Since few, if any, overstory trees are will be affected by the AOP installation, this action will have **neutral** effect on water temperature.

Tree removal has the potential to affect stream temperature through removal of trees that provide shade to streams. Tree removal adjacent to Brooks Meadow Creek accounts for about 0.06 acres of opening. The 25-foot wide opening will be perpendicular to the stream and thus still retain mature trees immediately adjacent to this small section of opening that will provide shade for the majority of the day. There is **discountable** chance that stream temperatures in LFH will be affected by this element due to the very slight increase in solar contribution at the crossing site, which is located 2.9 miles upstream of LFH. This is especially true since 4 tributaries enter Dog River between the project site and LFH, with contributions of 5-7 ºC flow, as measured during August 2000.

Proposed Action - Installation of Fish Screen and Diversion/Outlet Structures

The installation of fish screen and diversion structures are within the footprint of existing disturbed areas. As no shading of the stream will be affected, this project element has no causal mechanism to affect stream temperature. Therefore, installation of fish screening and diversion/outlet structures will have a **neutral** effect on stream temperatures.

Proposed Action - Temporary Staging Areas/Material Hauling

None of the temporary staging areas are in riparian reserve, thus there is no causal mechanism to affect stream shade. Timber and rock haul, regardless of location or duration, will not reduce shade and has no causal mechanism to increase water temperature. Therefore, both temporary staging areas and timber/rock hauling will have a **neutral** effect on water temperature.

Road maintenance has the potential to remove shade producing vegetation through danger tree removal near perennial streams. Proposed road maintenance activities (that includes danger tree treatment) are all located outside Riparian Reserves, except for the Dog River pipeline access road (Rd 1700-014 and 4400-011), which is within 100’ of Dog River and Brooks Meadow Creek for about 815’. This native surface pipeline access road is about 2.7 miles upstream of LFH, at its closest point (3.3 upstream of CH).

Approximately 815’ of pipeline road may have some danger trees removed within 100’ of Dog River and the mouth of Brooks Meadow Creek.

The removal of a few danger trees in this zone will have **discountable** effect to stream temperature in LFH due to the following:

- A very small amount (815’) of road is being treated, with <10 danger trees expected to need falling.

- At its closest point, this affected riparian area is about 2.7 miles upstream of Listed Fish Habitat (LFH), and there are 6 cold water tributaries between this point and LFH (tributaries contributed 4.5-10 °C flow when recorded during August 2000).
- Other than the 815’, the riparian corridor is intact and densely forested the entire length from the diversion to LFH.

Proposed Action - Pipeline Operations

Current operations entail the diversion of Dog River flow year-round. The entire flow of the river has typically been diverted by the City from June through October (approximately 3–10 cfs); however, only a portion of flows from November to May (approximately 30%–70%) are diverted. The proposed project will modify the current pipeline operations by leaving a minimum instream flow of 0.5 cfs (August 1 to October 31) during a portion of the low stream flow period. The new 24” pipeline has a total capacity of 26.3 cfs as compared to the current capacity of 12.3 cfs (a 114% increase). The expanded capacity would allow the filling of Crow Creek Reservoir faster by diverting a greater portion of the Dog River peak flows when available. Once the reservoir is full (historically by early February), pipeline diverted flows are reduced to around 3 cfs for the remainder of winter and early spring.

Flow diversions from the spring to fall of 2016 ranged from approximately 2.7 cfs in late September to 10.2 cfs in late May 2016, whereas Dog River flows ranged from 2.4 cfs in late September to 21 cfs in early May 2016. Although the entire flow of the river is diverted in the summer, surface flows are replaced by groundwater immediately downstream of the diversion. A USFS stream survey from July 26 – August 30 of 2000 noted wetted stream channel in all areas downstream of the diversion. The discharge rate of 8.3 cfs was recorded at the mouth on July 26, 2000.

The diversion is located at RM 6.0 and is 3.4 miles upstream of LFH in Dog River. Changes in pipeline operations from the diversion point to Crow Creek Reservoir has **neutral** possibility of affecting LFH in SF Mill Creek because there are no proposed changes to operations downstream of the reservoir, which is 7 miles upstream of LFH. Diversion of surface flow has the potential to increase downstream temperatures due to the lowered volume, reduced depth, and decreased buffering capacity, which is more prone to warming from solar exposure.

As displayed in the baseline temperature data, Dog River is a very cold system yearround within LFH and almost always meets the 13ºC requirements of listed fish species based on the ODEQ criteria. Current stream temperatures are warmest (above 10ºC) generally from June to September in the 11 years of available data. The proposed action will divert the same amount of flow (all available surface water) from June to July, while leaving more instream flow (0.5 cfs) in August through October than current conditions. As flow diversion will either be the same or lesser in amount during the warmest period (June-September) with the proposed action, there will be **discountable** effects to stream temperatures in Dog River LFH from current conditions.

Summary of Effects on Temperature

After field validation of stream habitat in the action area, project design criteria (PDC) were developed by the interdisciplinary team to minimize water quality impacts, including any from reduction of shade that may affect stream temperature. Some minor shade reduction may occur on perennial resident fish only streams within the action area, but effects will be **discountable** for LFH due to the combination of pronounced distance (>2.5 miles), existing cold year-round temperature baseline, cold spring influence (4.5-10 °C summer contribution) from multiple tributaries downstream of the action, a retention of 0.5 cfs minimum instream flow during August-October, and the small fraction (~900’) of canopy reduction as compared to intact riparian area in almost all of the action area.

3.4.2.2 Sediment and Substrate Character

No Action

For most of the length of Dog River, direct access to the channel would remain limited and human perturbation other than water management would be low. The stream banks and main channel could be expected to remain primarily stable, and the sediment supply would not be expected to undergo an aberrant change from previous trends. Substrate would continue to be dominated by gravels and cobbles. The average amount of fine sediment observed throughout all reaches would likely remain low to moderate on an area weighted basis (Hydrology Specialist Report). The failed culvert at Road 1700-014 at the Brooks Meadow crossing would continue to route fines into Brooks Meadow Creek resulting in an increase in fines at the local scale. If the culvert is not replaced, there would be no construction-related fines generated.

In South Fork Mill Creek substrate would be expected to remain dominated by coarse gravel. Fine sediment generated by streambank erosion and incision would essentially be routed through the system by the elevated water velocity that results from diverted Dog River flows, although it could continue to accumulate in the few pools or short aggrading segments in Reaches 1 and 2. Above the dam, the majority of fine sediment generated would most likely continue to settle in the reservoir, while below the dam it could accumulate behind the Wicks intake structure.

Proposed Action - Abandonment of Old Pipeline/Installation of New Pipeline

The primary elements of the project are the abandonment in place of the old 18" wooden pipeline and installation of the new 24" pipeline. Existing trees and dead wood will be cut and removed within the 25-foot pipeline right-of-way along the pipeline route within the pipeline service road. An excavator will dig approximately a 4-foot deep by 3 to 4-foot wide trench, piling the excavated material to either side. The excavator will place the pipe in the trench and then cover the pipe section with gravel or sand and fill in the ditch with the removed material. Additional gravel or sand will be transported to the excavator by a small rubber-tired or tracked vehicle.

This project element does not involve in-water work (except at Brooks Meadow crossing that is described in the project element below). At its closest point, this affected Riparian Reserve area is about 2.7 miles upstream of Listed Fish Habitat (LFH), and 3.3 miles upstream of CH, in Dog River.

Installation of a new pipeline outlet in the headwaters of SF Mill Creek has no possibility of affecting LFH because of the pronounced distance (>11 miles from pipeline outlet to LFH), and more significantly, the juxtaposition of an impoundment (28-acre Crow Creek reservoir/dam) that disconnects potential project impacts from LFH.

Installation of new pipeline adjacent to the existing pipeline does not involve any in-water work (except at Brooks Meadow crossing that is described in the project element below. Any potential overland erosion that may introduce suspended sediment to stream channels will not occur as there are PDCs that will be applied. The most pertinent one states, "Temporary Erosion Controls – Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities."

Due to this and other standard erosion control PDCs in place for this project, the probability that any fine sediment generated during pipeline placement traveling overland and reaching adjacent streams and LFH (2.7 miles downstream) is considered **discountable**.

Proposed Action - Installation of AOP and pipeline crossing at Brooks Meadow Creek

Instream excavation will be necessary to install the AOP at the current road ford crossing, as well as install the pipeline under the Brooks Meadows Creek channel.

The pipeline crossing is approximately 2.9 miles upstream of LFH on Dog River, with the AOP installation at approximately 3.0 miles upstream of LFH in Dog River. There is no hydrologic connection of this element to SF Mill Creek drainage.

Excavation work associated with installation of the AOP and the new pipeline at Brooks Meadow Creek could potentially introduce suspended sediment to the Brooks Meadow Creek stream channel. The installation of the AOP culvert as proposed will eliminate an active ford, thereby reducing potential turbidity and fine sediment at the site scale and benefitting resident fish species and habitat.

PDC will be applied that minimize sediment introduction to surface waters, including work area isolation during construction and timing during lowest flow period (ODFW in-water work window of July 15-August 31). Although PDC stipulate de-watering the culvert removal site during implementation, sediment will likely be mobilized and transported when the channel is re-watered post-construction, as well as during the first few significant precipitation events.

Silt, the sediment size most easily transported and that which usually results in turbid conditions, can be transported over a wide range of flows, even very low flows (Swanston 1991). However, the particles will settle where stream energy drops significantly such as behind obstructions. From 2010 to 2013, turbidity monitoring during all stream culvert removals and/or replacements on the Mt. Hood NF recorded that turbidity plumes were short lived and not visually detectable past 700' feet downstream of the worksite (MHNF, unpublished data as reported annually to NMFS and USFWS; NMFS 2013). Note that these observations were made mostly in anadromous streams that are larger than Dog River so in this smaller stream, most of the silt is not expected to be transported as far as in larger streams.

Turbidity decreases downstream from the source relatively rapidly both in space and time. A study on Idaho and Washington streams by Foltz et al. (2008) found that turbidity decreased by an order of magnitude within 328' of the source following culvert removal, and turbidity dropped to background levels within ½ mile on average. This distance is likely a much longer distance than what would occur in Dog River, as his study included 11 stream crossings, where 7 had no mitigation control in place (no de-watering of construction area and no restrictions on heavy equipment in live water). At the mitigated sites the turbidity and sediment yields directly below the road crossings were many orders of magnitude less than at unmitigated sites. At the three sites with mitigation the peak turbidity during construction (including channel re-watering) was 1,300 mg/L, compared with 9,900 and 22,000 mg/L at the two unmitigated sites.

In summary, the probability that fine sediment/turbidity will affect LFH in Dog River is **discountable** due to the following:

- Three years of formal monitoring of forest culvert installation and replacements show sediment/turbidity impacts to extend to a maximum of 700' downstream. Decades of on-site implementation monitoring observations is consistent with the formal monitoring results.
- Studies of culvert work, with much less mitigation controls in place, noted turbidity/sediment impacts up to 0.5 miles downstream. PDC will be applied at Brooks Meadow Creek sites to minimize sediment introduction to surface waters, including work area isolation during construction and construction timing during lowest flow period (ODFW in-water work window of July 15-August 31).

- LFH is ≥2.9 miles downstream of the instream culvert installation and pipeline crossing.

The installation of a new fish passable culvert at Brooks Meadow will have the long-term benefit of improving year-round resident fish passage and reducing sediment delivery downstream of the crossing. As a result, the culvert installation will have a beneficial effect to cutthroat trout over the long term.

Proposed Action - Installation of Fish Screen and Diversion/Outlet Structures

The diversion structure and fish screen are at RM 6.0 on Dog River; a distance of 3.4 miles upstream of LFH. The outlet structure is on SF Mill Creek, above Crow Creek Reservoir, and has no connection to LFH.

To minimize impacts to resident fish and habitat, fish screen installation and structure replacement activities are planned to be completed within the ODFW instream work period of July 15 to August 31. In order to reduce the potential for introduction of sediment into stream channels, streamflow will be diverted around work areas. Upon project completion, the construction site will slowly be re-watered to prevent loss of surface water downstream (as the construction site streambed absorbs water) and to prevent a sudden release of suspended sediment. Monitoring will be completed during re-watering to ensure no stranding of aquatic organisms occurs or excessive sediment is released below the construction site. These, along with other standard construction and erosion control PDC, will greatly reduce sediment/turbidity release into Dog River channel.

Sediment and/or turbidity levels will increase during re-watering and after the first few significant precipitation events post-construction. Turbidity monitoring of all 23 in-water aquatic restoration projects was completed on the Mt. Hood NF from 2010 to 2013. All projects followed pertinent PDC as required by the ESA consultation BO (NMFS 2013). Restoration projects were diverse in nature, and included culvert removal/replacement, large wood placement (via excavator and helicopter), side channel re-connection, and gravel/wood augmentation (downstream of dammed rivers). Monitoring showed that turbidity plumes were short lived and visually detectable from 25 to 1000 feet downstream of the worksite (MHNF, unpublished data as reported annually to NMFS and USFWS). In-stream wood placements via excavator (in live streams) were the type of project that generally created the longest turbidity plumes downstream.

The combination of construction and erosion-control PDCs, as well as the extended distance upstream (3.4 miles) from LFH, eliminates the likelihood of sediment/turbidity to affect LFH, and thus is **discountable** in effect.

The installation of a new fish screen at the diversion will reduce entrainment of fish during most of the year. As a result, the fish screen will have a beneficial effect to cutthroat trout over the long term.

Proposed Action - Temporary Staging Areas/Material Hauling

There are multiple staging areas identified for the construction period. None are in a Riparian Reserve. As there are no surface hydrologic connection to streams or other waterbodies (PDC A-5), the use of temporary staging areas will be **discountable** in sediment/turbidity effect to LFH.

Roads where equipment, materials, and gravel or log hauling will occur within the action area are located outside Riparian Reserves with 3 exceptions:

- The Dog River pipeline access road (Rd 1700-014 and 4400-011), which is within 100’ of Dog River and Brooks Meadow Creek for about 815’: This native surface pipeline access road has one stream crossing at Brooks Meadow Creek, which is about 3.0 miles upstream of LFH.
- The 1700 road at the Brooks Meadow Creek crossing: This paved road crossing is about 3.1 miles upstream of LFH. Roadsides are densely vegetated at this location. No maintenance will be needed for this road system as associated with this project.
- Oregon Highway 35 (over Dog River near the confluence of EFHR) and Road 4400 which crosses Dog River as well as several smaller streams: These road crossings do cross over LFH. Both roads are paved, have wide shoulders and good drainage. No maintenance will be needed for these road systems as associated with this project.

The haul on paved Oregon Highway 35, Road 44, and Road 1700, as well as the lack of associated road maintenance actions, will not cause any soil or instream disturbance that would lead to sediment/turbidity effects at the site scale nor at LFH (**discountable** effect).

The native surface Dog River pipeline access road (Rd 1700-014 and 4400-011) will have haul as well as associated road maintenance actions, which include:

- Cleaning of road cross drain culverts, sloping the road to drain, and/or install water bars to help drain surface and reduce sediment flows.
- Placing, rolling and compacting 3/4” (-) aggregate material 100’ each direction of road crossing at Brooks Meadow Creek crossing to minimize the delivery of sediment erosion to the stream.
- (If road is to be used in the wet season) surfacing of road with 3” (-) aggregate or other surfacing material to minimize sediment flows.

Haul, and associated road maintenance, conducted further from stream channels than the closest drainage relief culvert is not expected to result in sediment increases in area streams because the drainage relief culverts empty onto well-vegetated areas that are not hydrologically connected to stream channels. The presence of well-vegetated buffers between cross drain culvert outlets and streams will be sufficient to halt overland erosion before it can enter streams. The Dog River access road has one short point of surface hydrologic connection to streams at the Brooks Meadow Creek crossing. The stream at this location is <1 cfs summer flow, with little annual variation due to its spring-fed source about 1 mile upstream.

Although the entire goal of road maintenance is to reduce sediment transport from existing conditions (including conversion of native road stream crossing to aggregate surface, installation of water bars to improve draining onto vegetated surfaces and the cleaning of road drain culverts), road maintenance activities do have the potential to increase short-term road crossing related erosion and sediment during rainfall events due to initial soil surface disturbance. Temporary Erosion Controls adjacent to the stream crossing and through road ditches will capture sediment before it enters the stream channel. Any turbidity created by road maintenance activities would most likely be washed from the road or ditch surface in the first few precipitation events immediately after work has been completed. These sporadic events may cause disturbed fine soil to be mobilized downstream and potentially into stream channels for a short time. Overall, road maintenance will have a **discountable** effect in sediment/turbidity to LFH.

Proposed Action - Pipeline Operations

The changes in pipeline operations (diversion flow timing and volume) does not involve any soil disturbance or instream alterations. This project element has no causal mechanism to affect sediment/turbidity, therefore, will have a **neutral** effect on this indicator.

Changes in pipeline operations (diversion flow timing and volume) from the diversion point to Crow Creek Reservoir has **neutral** possibility of affecting sediment/turbidity levels in LFH in SF Mill Creek because there are no proposed changes to operations downstream of the reservoir, which is 7 miles upstream of LFH.

Summary of Effects on: Sediment and Substrate Character

The proposed project will result in disturbed soil in localized areas that has the potential to enter stream channels; primarily associated with diversion structure replacement/fish screening, material hauling, road maintenance, and AOP installation. Sediment/turbidity levels may be detectable at the site scale within resident fish only streams but will be **discountable** at LFH due to multiple PDC that minimize sediment mobilization, as well as the pronounced distance (≥2.9 miles) between instream work and LFH. Over the long term, the new culvert installation should result in reduced sediment delivery at the local scale.

3.4.2.3 Chemical Contamination/Nutrients

No Action

Currently, there are very low potential sources for chemical contamination in the Dog River and South Fork Mill Creek watersheds. Most of the upper action area is closed to entry within The Dalles Watershed Management Area. The rest of the area is largely commercial forest land, which also has seasonal recreation use. There is no agricultural or industrial land in the action area. Highway 44 is paved and as a result may contribute to vehicle related chemicals/pollutants at stream crossings over Dog River and Brooks Meadow Creek at the local scale but has not been identified as a process of concern. Oregon Highway 35 is the only (paved) road that crosses LFH. This road is designed to route road surface contaminants onto vegetated areas. Therefore, chemical contamination is not a process of concern in the action area.

Proposed action

Installation of new pipeline, AOP culvert placement, diversion structure/fish screen and outlet replacement all require heavy equipment that carry and use petrochemicals to work within resident fish stream channels. It is extremely unlikely that heavy equipment and haul vehicles will spill contaminants. Standard construction PDC are in place to ensure that materials for emergency hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present), as well as requiring all equipment used for instream work be cleaned for petroleum accumulations, and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes, etc.), and gas-powered equipment with tanks larger than five gallons.

Based on decades of staff experience that encompass tens of thousands of log truck loads hauled off the MHNF, as well as use of heavy equipment for in-stream restoration projects, there have been very few chemical spills ever noted. Log/rock/pipe hauling, and use of heavy equipment in-stream will have a **discountable** effect on chemical contamination in LFH and **may impact individuals and habitat** for resident fish.

Proposed Action - Pipeline Operations

Pipeline operations does not involve the use of any agricultural or industrial contaminants, nor involve use of nutrients, thus has no causal mechanism for contamination in resident trout habitat or in LFH – the effect is **neutral**.

Summary of Effects on Chemical Contamination/Nutrients

With PDC in place, the potential contaminants used as part of project implementation are not likely to enter the stream network. Therefore, there will be a discountable effect on the indicator in LFH/CH and may impact individual fish and habitat for resident fish.

3.4.2.4 Physical Barriers

No Action

Currently, there are numerous natural barriers (steep gradients and waterfalls) in both the Dog River Watersheds and Mill Creek. As previously described, these waterfalls act as upstream migration barriers to anadromous fish. There are no anthropogenic barriers to ESA listed fish in the action area. However, there are several anthropogenic barriers to resident trout migration in the action area. The Dog River diversion structure at RM 6.1 is almost a complete barrier to upstream migration but does allow for downstream fish passage during higher flow periods. The culvert that passes Dog River under USFS Road 17 is classified as a year-round migration barrier. And two culverts on Brooks Meadows Creek are barriers (USFS 1710 Road crossing and USFS 4400 – 014). Wicks Reservoir acts as an upstream barrier to resident fish in Mill Creek. Under the No Action alternative, there would be no change to listed fish or resident trout migration in the action area.

Proposed Action – Installation of AOP Culvert

None of the action elements are located in LFH stream channels thus there is no causal mechanism to affect this indicator. The project activities neither correct nor create any fish passage barriers for ESA-Listed Species, although resident cutthroat trout will **benefit** locally from fish screening of the Dog River diversion structure and replacement of a ford crossing with an AOP culvert in Brooks Meadow Creek. All projects elements have a **neutral** effect to LFH for this indicator within the action area.

Proposed Action – Installation of Fish Screens & Diversion Outlet Structure

None of these action elements are located in LFH stream channels thus there is no causal mechanism to affect this indicator. Installation of fish screens at the outlet structure does prevent resident trout from being entrained into the pipeline during most of the year. However, since the fish screens may not operate in winter, resident trout will likely still be entrained during that time. These project elements neither correct nor create any fish passage barriers for ESA-Listed Species but resident cutthroat trout will benefit from better fish screening of the Dog River diversion structure. All projects elements will have **No Effect** to LFH for this indicator within the action area and a neutral effect to resident trout.

Proposed Action – Abandonment of Pipeline and Temporary Staging

None of these action elements are located in LFH stream channels thus there is no causal mechanism to affect this indicator. These action elements have no causal mechanism to create passage barriers for resident trout. All project elements will have **No effect** to LFH or resident trout for this indicator within the action area.

Summary of Effects on Physical Barriers

Under the proposed action alternative resident fish would benefit slightly from improved passage at Brooks Meadow Creek and reduced entrainment into the pipeline. There would be no change in the proposed or no action to LFH/CH. Therefore, there will be a **neutral effect** on the indicator in LFH/CH.

3.4.2.5 Large Woody Debris, Pool Frequency & Quality/Large Pools, Off-channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, and Streambank Condition

These habitat indicators are grouped together in this effects analysis because they are interrelated, and in this action area these indicators are often linked with the amount of in-channel and floodplain large wood.

No Action

Large wood recruitment potential would not be affected under the No Action alternative in any of the action area. Almost all the action area streams are very close to meeting AP standard for >20 pieces per mile and recruitment potential along nearly the entire length of Dog River will remain high. In the South Fork Mill Creek subwatershed, large wood recruitment along riparian corridors is also good. These stream reaches are all within The Dalles Watershed Management Unit and located on lands administered by the Forest Service downstream to Crow Creek Reservoir. Within the pipeline right of way, trees will continue to be removed as needed to maintain the integrity of the pipeline.

Under the No Action Alternative, diversion from Dog River and storage and release in Crow Creek Reservoir would continue to modify the flow regime in the Dog River and South Fork Mill Creek subwatersheds.

In Dog River, changes to channel forming processes related to modified streamflow would continue to mostly affect Reaches 1, 2, and the lower segment of 3. Effects would be greatest in the lower segment of Reach 3 immediately below the diversion because it would continue to be partially dewatered for a half-mile downstream to Cooks Meadow in the summer and early fall months. The overall reduction in average annual flow and the absence of base flows in this reach would continue to be the cause for the decline of pool depth and quality, a decrease of the width-to-depth ratio, and a reduced wetted perimeter.

In SF Mill Creek, elevated average base and peak flows will continue to increase water velocity seasonally and gradually deepen entrenchment. Width-to-depth ratios could be expected to slowly decrease, and the wetted perimeter enlarge. The short segments of channel where unstable and undercut streambanks were observed in Reaches 1 and 2 could progressively expand. For these reasons, pool abundance and quality would remain low. Most of the segments in each of these reaches would continue to be fast flowing, and not conducive to pool formation.

Off-channel habitat and floodplain connectivity will remain unchanged under the no action alternative largely due to the confined valley form and steep gradients that exist in Dog River and the moderately confined valley form of SF Mill Creek. Highway 35 will continue to constrict Dog River's floodplain at its confluence with the East Fork Hood River.

Proposed Action - Abandonment of Old Pipeline/Installation of New Pipeline

Approximately 600 existing trees will be removed along approximately 1,500 feet of the pipeline corridor in relatively close proximity to aquatic habitat; however, this portion of the pipeline route is not near LFH, therefore, the action will have a **discountable** effect on LFH and minor, site scale effect on resident fish habitat. No construction activities will be close enough to Dog River to affect stream channel characteristics.

Proposed Action - Installation of AOP and Pipeline Crossing at Brooks Meadow Creek

Brooks Meadow Creek will be temporarily dammed during the low-flow summer period and the water will be re-routed around the work area as the pipe is being installed. The pipe will be laid under the creek channel and the creek channel will be rehabilitated back to existing channel conditions to the degree possible. A temporary culvert at the existing crossing could be installed during construction and removed after completion of the project. The installation of a new AOP at Brooks Meadow Creek should improve channel process in the short segment below the road. Erosion will be reduced which should improve pool formation and function; flow will no longer go overland providing for improved channeling forming processes immediately downstream.

Installation of the AOP and burial of the pipeline will be conducted in areas previously disturbed by a road crossing (ford) and previous pipeline burial. None of the action elements are located in LFH stream channels therefore, the action will have a **discountable** effect on LFH and minor, site scale effect on resident fish habitat.

Proposed Action - Installation of Fish Screen and Diversion/Outlet Structures

The new diversion/outlet structures and the fish screen will be constructed in approximately the same locations as the existing structures; however, these structures are not located in or near LFH/CH. Instream work associated with fish screen and diversion/outlet structures will not affect channel characteristics in the immediate area or in downstream LFH, therefore the effect will be **neutral** and no further analysis is necessary. PDC and BMPs will greatly minimize the amount sediment entering Dog River and South Fork Mill Creek during construction of these instream structures. Sediment from this element will have an **insignificant** effect on turbidity and fine sediment levels in LFH and minor, site scale effect on resident fish habitat during project implementation but should result in benefits to resident over the long-term.

Proposed Action - Temporary Staging Areas/Materials Hauling

Road crossings and landing areas that may affect instream habitat elements are located at least 0.2 miles from LFH/CH and as a result will have a **discountable** effect on LFH but could result in minor, site scale effects to resident fish habitat.

Fine sediment generated from hauling traffic will increase in action area streams at road crossings. Most of this sediment will disperse and settle before reaching LFH; however, some will eventually make its way into LFH. As in upper stream reaches this fine sediment will be deposited in slow water habitats, primarily pools and stream margins. The small amount of fine sediment reaching LFH would be immeasurable against background levels, thus sediment deposition in pools will have a **discountable** effect on pool quantity and quality, and the number of large pools will remain the same. Similarly, sediment deposition will have a **discountable** effect on stream width to depth ratio and habitat refugia due to the small amount of sediment deposited.

Proposed Action - Pipeline Operations

In the Dog River sub-watershed, channel characteristics would continue to be altered by the modified flow regime. Winter and summer flows would continue to be affected most. Early and mid-winter flows would be attenuated which could alter the redistribution of substrate and subsequent re-working of the channel configuration, potentially reducing pool depth, LWD density, and habitat heterogeneity (Poff et al. 1997).

Elevated flows diverted into South Fork Mill Creek from Dog River have the potential to alter stream channel habitat indicators; however, it is unlikely that volumes entering the pipeline will exceed current volumes. Pipeline operations will manage diverted flows so that the erosive effects to the channel from high magnitude surges of water will be minimized. Changes in pipeline operations from the diversion point to Crow Creek Reservoir has **neutral** possibility of affecting LFH in SF Mill Creek because there are no proposed changes to operations downstream of the reservoir, which is 7 miles upstream of LFH.

The proposed action will divert the same amount of flow November to July, while leaving more instream flow (minimum 0.5 cfs) from August through October than current conditions. As flow diversion will be the same or lesser in amount, the transport of large wood, and the maintenance/creation of pools and other habitat features will be maintained. The increase in instream flows at the diversion point (RM 6) from August to October may have the potential to have slight **positive (beneficial)** effects to pool volume in LFH (RM 2.6) during this typical low-flow period in Dog River.

Summary of Effects on Large Woody Debris, Pool Frequency & Quality/Large Pools, Off-channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, and Streambank Condition

Overall, the Dog River Pipeline Project construction elements will result in **discountable** effects to channel habitat indicators as described above. Disturbance is small in scale (<1 acre) and > 2 miles from LFH. The proposed action includes diversion of the same amount of flow (all available surface water) from November to July, while leaving more instream flow (0.5 cfs) from August through October than current conditions. As flow diversion will be the same or lesser in amount, the transport of large wood, and the maintenance/creation of pools and other habitat features will be maintained. The increase in instream flows at the diversion point (RM 6) from August to October may have the potential to have slight **positive** effects to pool volume in LFH (RM 2.6) during this typical low-flow period in Dog River.

3.4.2.6 Change in Peak/Base Flows

No Action

Under the No Action Alternative, diversion from Dog River and storage and release in Crow Creek Reservoir would continue to modify the flow regime in the Dog River and South Fork Mill Creek subwatersheds.

In South Fork Mill Creek mid- and early winter flows, spring flows, and summer flows would continue to be affected most. Direct access to the main channel of South Fork Mill Creek would remain limited and human perturbation other than water management would be low. Average peak flows in early and mid-winter would remain elevated above naturalized levels due to contributions from diversion. Below the dam, they would be reduced due to the filling of the reservoir and retention for storage. Average spring peak flows would remain higher than naturalized above and below the dam because of diversion contributions and spill combined with release. Base flows above and below the dam would also remain elevated above naturalized levels due to contributions from diversion and releases downstream. Changes in habitat quality would continue to have a slightly negative effect on resident trout habitat process and No Effect or Neutral on LFH/CH.

In Dog River, effects to streamflow from pipeline diversion would continue to be greatest during the late summer and early fall when flows are lowest, and nearly 100 percent of upper Dog River is diverted into the pipeline. During this time, the lowest eighth of a mile segment of Reach 3 below the pipeline diversion would continue to be partially dewatered reducing the quantity of available habitat to resident trout and aquatic macroinvertebrates. Instream flows to this segment would continue to be restored naturally just downstream by springs, seeps, and hyporheic flow. Reaches 1 and 2 of Dog River would remain a perennial stream type. Impacts to LFH/CH in reach 1 would continue to be negligible

Proposed Action - Abandonment of Old Pipeline/Installation of New Pipeline

Pipeline operations is the primary project element affecting potential changes in peak/base flows. Pipeline abandonment and installation of the new pipeline will not affect existing conditions because it will be necessary to maintain diversion of water through a temporary pipe while the new pipeline is under construction. The same is true for installation of the AOP and installation of the new pipeline at Brooks Meadow Creek. Flows will be maintained and diverted during construction activities for all related project structures (Hydrologist Specialist Report).

The abandonment and installation of the new pipeline will have a **neutral** effect on LFH/CH since flows will be maintained during construction through a temporary bypass pipe. The removal of trees and the resultant reduction in canopy cover to install the new pipeline and maintain a service road has the potential to indirectly influence peak/base flows. A reduction in canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. Temporary staging areas and haul routes are largely in previously disturbed areas and no overstory trees are expected to need removal. This element has no causal mechanism (**neutral**) to affect changes to peak or base flows.

The abandonment and installation of the new pipeline would remove trees from around 11 acres in total, with the vast majority (9.7 acres) in the Dog River subwatershed. This accounts for around 0.1 % of watershed in Dog River subwatershed and 0.01% of the South Fork Mill Creek subwatershed. Given the high canopy cover and low level of disturbance in the current action area, it is unlikely (**discountable effects**) that the action area will experience increased base flow or modified peak flows due to the extremely minor acreage of forest canopy removal to install the new pipeline and maintain a service road.

Proposed Action - Installation of AOP and pipeline crossing at Brooks Meadow Creek

Activities associated with the construction of the project have low potential to cause impacts to water quantity in Brooks Meadow Creek. The damming and diversion of Brooks Meadow Creek during the construction period may result in a temporary decrease in water quantity in the lowest reach of the creek and in Dog River while the AOP (culvert) is being installed; however, the decrease would be temporary and minimal. Additionally, a section of the creek may be transformed into a small reservoir (slower velocities, greater water depths, etc.) until the temporary dam is removed and the creek is routed through the new culvert under the access road.

Brooks Meadow Creek is not in close proximity to LFH or CH, therefore the temporary damming and diversion of the creek will not affect listed fish species. The existing ford of Brooks Meadow Creek is approximately 2.1 miles from the nearest LFH/CH. As a result of this proximity assessment, the effect of this action on peak/base flows is **neutral** and no further analysis is needed.

Proposed Action - Installation of Fish Screen and Diversion/Outlet Structures

This project element has no causal mechanism to affect this indicator as flows will be maintained during construction.

The proposed fish screen and diversion/outlet structures in Dog River and South Fork Mill Creek are not in close proximity to LFH or CH and existing flows will be maintained during construction activities, therefore these activities will not affect aquatic species or LFH/CH. As a result, the effect of these actions on peak/base flows are expected to be **neutral** and no further analysis is needed.

Proposed Action - Temporary Staging Areas/Materials Hauling

Temporary roads and material hauling will not occur in the proximity of LFH/CH therefore the effects of these activities on peak/base flows will be **neutral** and no further analysis is needed.

Proposed Action - Pipeline Operations

The Proposed Project will continue to divert flows from Dog River into South Fork Mill Creek for storage in Crow Creek Reservoir. A portion of the river's flow will be diverted by the pipeline throughout the year, thus altering both peak and base flow. The effects of diversion on peak flows would continue to be greatest during the late fall and early winter months when Crow Creek Reservoir is filling. Diversion will decrease the overall magnitude of mean daily peak flows in Dog River during that time. Data indicate it could be by as much as 70 percent in a year when total fall/winter precipitation is below normal. The majority of peak runoff however, which occurs in the spring, would not be expected to be attenuated nearly to that degree. This is because in most years, Crow Creek Reservoir would be filled by early to mid-February. Typically, the majority of the spring freshet would not be diverted, and would pass downstream to lower Dog River (Hydrology Specialist Report). Summer base flows in Dog River would increase compared to existing conditions as a result of the required minimum in-stream flow of the 0.5 cfs from August 1 to October 31. The majority of the Dog River flow (~80%–83%) would still be diverted from the channel during these low-flow periods. The greatest potential for impacts to water quantity would be within Reach 3 of Dog River immediately downstream of the intake; however, inputs from hyporheic flow and perennial tributaries (such as Brooks Meadow Creek) that enter Dog River shortly downstream of the diversion will help recover its surface flow.

The replacement of the Dog River pipeline will have low potential for short- and long-term impacts to peak/base flows in the Dog River and South Fork Mill Creek watersheds.

During high flow periods (winter and spring) pipeline operations will have the potential to decrease water quantity in Dog River because of the expanded capacity of the replacement pipeline (24-inch diameter) to divert additional water. This expanded capacity will allow The Dalles to fill Crow Creek Reservoir faster by diverting a greater proportion of peak flows when they are available. Once the Reservoir is filled, the amount of diverted flow will be decreased. Pipeline diversions during high-flow periods will decrease the magnitude of peak flows in the river, since up to 26.3 cfs (73% of the estimated D5 flow of 35.9 cfs) (USGS 2017) could be diverted. The diversion capacity of the replacement pipeline will be greater than the average monthly flow in May (15.6 cfs) and June (18.2 cfs) in Dog River upstream of the diversion (MHNF 2017a), therefore the pipeline will only be filled during peak runoff events. USGS streamflow records from 1960–1971 indicate that Dog River flows at the site of the diversion may reach 26.3 cfs or greater in 2 of every 3 years; however, the duration of those peak flows will be minimal. The potential to divert the entirety of spring runoff flows into the pipeline will generally be constrained by flow availability (peak flows may only last a matter of hours or days) and Crow Creek Reservoir storage capacity. It is expected that the diversion schedule will be similar to the existing schedule although the larger replacement pipeline will be filled to capacity less frequently, due to the larger capacity of the replacement pipeline.

Changes in flows to Reaches 1–3 downstream of the diversion have the potential to be greater than those associated with existing conditions because of the increased capacity of the replacement pipeline. However, the existing pipeline is rarely filled to capacity due to lack of flow in Dog River and/or Crow Creek Reservoir storage capacity.

The Dog River pipeline inlet (Lat/Long is: N 45 24.454 W 121 31.156) is located at about river mile (RM) 6.0 in Dog River, or about 0.5 RM upstream of the Forest Service Rd 4400 in the Dog River 6th field subwatershed of the East Fork Hood River 5th field watershed. The Dog River pipeline outlet (Lat/Long is: N 45 25.904 W 121 31.2544,054) flows into the South Fork Mill Creek at about RM 15.5.

South Fork Mill Creek is the primary drainage in the South Fork Mill Creek 6th field subwatershed of the Mill Creek 5th field watershed. Only the lower reaches (reaches 1 and 2) of Dog River is in proximity to LFH and critical habitat. Effects to LFH in this reach are likely to be **discountable** because input from hyporheic flow and perennial tributaries such as Brooks Meadow Creek that enter Dog River shortly downstream of the diversion will help recover surface flow diverted through the pipeline.

The probability of affecting seasonal peak and base flows in LFH/CH within the action area is not discountable. The slight negative effect from this project element is **insignificant** in magnitude and presents no measurable risk to listed species or habitat.

The potential for effects to the quantity of water in South Fork Mill Creek will be low under the Proposed Action although peak flows will have the potential to increase from 12.3 to 26.3 cfs (a 114% increase) with the expanded pipeline capacity. Despite the increased pipeline capacity, the frequency with which the pipeline will be filled to capacity will be low due to the lack of available Dog River flow and Crow Creek Reservoir storage capacity limitations. Additionally, habitat impacts from higher magnitude surges during peak flows will be minimized through management of pipeline operations.

The Dog River replacement pipeline will have low potential for short- and long-term impacts to peak/base flows within the Dog River watershed. A portion of the river's flow will be diverted by the pipeline throughout the year, thus reducing water quantity; although the severity of impacts will vary seasonally and will only change from the existing condition during August 1 to October 31 due to the inclusion of a Project Design Criterion that will require a minimum in-stream flow of 0.5 cfs to be left in the river during that period. The flow in Dog River during these months would increase thus reducing the magnitude of water quantity effects. The majority of the Dog River flow (~80%–83%) will still be diverted from the channel during this low-flow period. The only potential for water quantity impacts to LFH will be within Reach 1where listed species may be present; however, inputs from hyporheic flow and perennial tributaries (such as Brooks Meadow Creek) that enter the river shortly downstream of the diversion will help to recover surface flow in this lower reach. Installation of a new pipeline would eradicate the water loss that has persisted for many decades from the old conveyance line. The total amount of water loss would no longer factor into the amount of water diverted from Dog River to meet demand. Conveyance of water using the new pipeline would become more efficient, so that only the water needed to meet demand would be withdrawn. The amount of unused water diverted from Dog River could be minimized. Since operations that manage the timing and amount of water diverted from Dog River would change little under the Proposed Action, the amount of water loss due to leakage could become available as bypass flow downstream, or to fill Crow Creek Reservoir earlier in the winter and maintain its surface elevation longer into the spring. The water that was lost to leakage during base flows, would be available for maintaining at least 0.5 cfs bypass flow downstream to lower Dog River from August 1 to October 31.

During high flow periods (winter and spring) the Project has the potential to decrease water quantity in Dog River due to the expanded capacity of the replacement pipeline (24-inch diameter) to divert additional water. This expanded capacity will allow The Dalles to fill Crow Creek Reservoir faster by diverting a greater proportion of peak flows when they are available. Once the Reservoir is filled, the amount of diverted flow will be decreased. Pipeline diversions during high-flow periods will decrease the magnitude of peak flows in the river, by as much as 26.3 cfs (73% of the estimated D5 flow of 35.9 cfs) (USGS 2017). The diversion capacity of the replacement pipeline will be greater than the average monthly flow in May (15.6 cfs) and June (18.2 cfs) in Dog River just upstream of the diversion (MHNF 2017b), and therefore the pipeline could only be filled during peak runoff events. USGS streamflow records from 1960–1971 indicate that Dog River flows at the site of the diversion may reach 26.3 cfs or greater in 2 of every 3 years; however, the duration of those peak flows may be minimal. It is expected that the diversion schedule under the Proposed Action will be similar to existing volumes, although the larger replacement pipeline will be filled to capacity less frequently, due to the larger capacity of the replacement pipeline.

Effects to Reaches downstream of the diversion have the potential to be greater than those associated with existing conditions due to the increased capacity of the replacement pipeline. However, the existing pipeline is rarely filled to capacity due to lack of flow in Dog River and/or Crow Creek Reservoir storage capacity.

Summary of Effects on Peak/Base Flows

Installation of AOP and pipeline crossing at Brooks Meadow Creek, and installation of fish screen and diversion/outlet structures has no causal mechanism to affect this indicator (**neutral**) since baseline flows will be maintained during and post construction, and no removal of trees will occur. A reduction in canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. Temporary staging areas and haul routes are largely in previously disturbed areas and no overstory trees are expected to need removal. This element also has no causal mechanism (**neutral**) to affect changes to peak or base flows.

There are no proposed changes to operations downstream of Crow Creek Reservoir, which is 7 miles upstream of LFH, thus there is **neutral** possibility of affecting baseline peak/base flow levels in LFH in SF Mill Creek.

The larger Dog River diversion pipe capacity may allow larger flow volume to be captured opportunistically from episodic storm events from November-February over the current 12.3 cfs, and these short-term events may allow reservoir fill at a few days (to weeks) earlier than current rate. The quantity of water diverted from upper Dog River and its tributaries would remain largely unchanged from current conditions between early November and July, thus there will be **discountable** effects to peak flows in Dog River. The change in pipeline operations to maintain at least 0.5 cfs bypass flow at the diversion point from August 1 to October 31 is expected to result in a slight increase in base flow in LFH that is 3.4 miles downstream. Overall, there may be a slight **positive** effect from this project element at LFH from the increased base flow volume as compared to baseline (no bypass flows at diversion point). This is expected to benefit Coho and Chinook spawning habitat, as well as slightly increase rearing habitat (pool depth) for steelhead, Coho and Chinook juveniles.

3.4.2.7 Effects Determination

Determinations for the proposed action were made as a result of analysis at the 6th-field watershed scale. The checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators was consulted for this project and a cumulative effects analysis was completed. Potential effects to steelhead trout, Chinook salmon, Coho salmon, and resident cutthroat and rainbow trout using a habitat approach is summarized below (Table 55). The AP provides a dichotomous key which is utilized to reach the appropriate ESA effect determination (Table 56).

Potential effects to water quality or habitat resulting from the project will be substantially diminished and immeasurable by the time they reach known occurrence of LCR chinook, Coho, and steelhead therefore the effects will be discountable and the determination **Not Likely to Adversely Affect (NLAA)**. Under the proposed project there will be **No Effect (NE)** to Middle Columbia River (MCR) steelhead and their critical habitat since they are not known to occur within the project action area.

The Magnuson-Stevens Fishery Conservation and Management Act (amended 1996) required designation of Essential Fish Habitat (EFH) for Chinook and Coho salmon. The Dog River and East Fork Hood River Basins (HUC 17070105) are designated as Chinook and Coho salmon EFH. Although both species have been documented in the EFHR and lower Dog River, EFH would not be adversely affected (NAA) by the project since project effects will be ameliorated within the distance from the intake structure downstream to their known occurrence.

Coastal cutthroat trout and Dalles Juga are present in the project area where in-water activities will occur. The project **may impact coastal cutthroat trout and Dalles Juga individuals or habitat (MIIH).** However, project actions will not likely contribute to a trend towards federal listing since fish present in the immediate area will be relocated prior to in-water work as per project PDCs and BMPs. Impacts are expected to be minimal and localized. The project will likely benefit cutthroat trout by providing additional bypass flow during the typical low flow period (August 1to October 31) in Dog River downstream of the intake structure.

Pacific lamprey is thought to be present only in the lower reach of Dog River and the South Fork of Mill Creek although its presence has not been documented. Upper limits for Pacific lamprey in South Fork Mill Creek is likely Mill Creek falls at RM 3.0 and lower Dog River below Dog River falls. The project **may impact pacific lamprey individuals or habitat (MIIH).**

Inland redband trout may be present in the North Fork Mill and South Fork Mill Creek 6th field subwatershed but are not present in the project area or action area. Salmonids in South Fork Mill Creek above Mill Creek Falls are cutthroat trout (USFS, 2000). For this analysis, resident inland redband trout distribution is assumed to be the same as MCR steelhead distribution, therefore the effects determination is no impact.

Table 55. Summary of effects of project elements on aquatic habitat indicators.

Indicator	Element Summary						Indicator Summary
	Action Area Baseline Condition	Pipeline Abandon/ Installation	AOP	Fish Screen/ Inlet/ Outlet	Roads/ Material Hauling	Pipeline Ops.	
Temperature	PF	D	D	N	D	D	D
Sediment and Substrate Character	PF – Dog River FAR – SF Mill	D	D	D	D	N	D
Chemicals/Nutrients	PF	D	D	D	D	N	D
Physical Barriers	PF	N	N	N	N	N	N
Large Woody Debris	FAR	D	D	N	D	B	D
Pool Frequency and Quality, Large Pools	FAR	D	D	N	D	B	D
Off-channel Habitat, Floodplain Connectivity	FAR	D	D	N	D	B	D
Refugia	FAR	D	D	N	D	B	D
Width to Depth Ratio	FAR	D	D	N	D	B	D
Streambank Condition	PF	D	D	N	D	B	D
Change in Peak/Base Flows	FAR	D	N	N	D	D for Peak B for Base	D

Table key:

PF	Properly functioning	N	Neutral
FAR	Functioning at risk	D	Discountable
NPF	Not properly functioning	I	Insignificant
		B	Beneficial

Table 56. Analytical process project effects determination key for species and designated critical habitat

1) Do any of the indicator summaries have a positive or negative conclusion?		
	X	Yes **-** Go to 2
		No – No Effect
2) Are the indicator summary results only positive?		
		Yes – NLAA
	X	No – Go to 3
3) If any of the indicator summary results are negative, are the effects insignificant or Discountable?		
	X	Yes – NLAA
		No – LAA, fill out Adverse Effects Form

This project was designed to minimize negative effects to aquatic habitat, water quality, and ESA listed fish species and sensitive aquatic species through PDCs, while still meeting the resource objectives identified in the proposed action.

This project is located in relatively close proximity to habitat utilized by summer steelhead, spring Chinook and Coho salmon so land management actions are often likely to expose fish to negative effects. However, the implementation of this project will not likely result in negative effects of measurable magnitude to any of the habitat or population indicators. Direct take to any listed fish in the action area will not occur under implementation of any project element.

Table 57. The Dog River Pipeline Project effects determination summary for ESA listed species, designated critical habitat and essential habitat, and Region 6 Regional Forester's Sensitive Species.

Listed Species Or Habitat	**ESA Status**	**ESA / EFH ESA/EFH Determination**	
		No Action	**Proposed Action**
Lower Columbia River Chinook Salmon – Critical Habitat	Designated	May Affect, Not Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**
Lower Columbia River Chinook Salmon – Essential Habitat	Designated	Not Adversely Affected	**Not Adversely Affected**
Lower Columbia River Coho Salmon – ESU	Threatened	May Affect, Not Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**
Lower Columbia River Coho Salmon – Critical Habitat	Designated	May Affect, Not Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**
Lower Columbia River Coho Salmon – Essential Habitat	Designated	Not Adversely Affected	**Not Adversely Affected**
Lower Columbia River Steelhead Trout – ESU	Threatened	May Affect, Not Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**
Lower Columbia River Steelhead Trout – Critical Habitat	**Designated**	**May Affect, Not Likely to Adversely Affect**	**May Affect, Not Likely to Adversely Affect**

Region 6 Sensitive Aquatic Species	**Location**	**No Action**	**Proposed Action**
Pacific Lamprey	Dog River, Mill Creek	May Impact Individuals or Habitat	**May Impact Individuals or Habitat**
Cutthroat Trout	Dog River, Mill Creek	May Impact Individuals or Habitat	**May Impact Individuals or Habitat**
Dalles Juga	Mill Creek	May Impact Individuals or Habitat	**May Impact Individuals or Habitat**
Rocky Mountain Duskysnail	Dog River, Mill Creek	May Impact Individuals or Habitat	May Impact Individuals or Habitat

3.4.2.8 Cumulative Effects

Cumulative effects include the effects of past, present, and reasonably foreseeable future state, tribal, local or private actions that overlap in time and space within the action area (i.e., affected environment) of the Federal action subject to consultations (50 CFR 402.02). The "reasonably foreseeable" clause is a key factor in assessing and applying cumulative effects and could include actions that are permitted, imminent, have an obligation of venture, or have initiated contracts (U.S. Fish and Wildlife Service and NOAA Fisheries 1998). Past and present impacts are incorporated as part of the environmental baseline and discussed below.

Only those indicators that are affected by the project are included in the cumulative effects analysis; if the action has no direct/indirect effects there would be no cumulative effects. The spatial context for the following cumulative effects analysis is the action area as described previously. Project activities occurring outside this area may have an effect on aquatic species and/or habitat but would not add to those effects from project activities proposed in this environmental assessment. The temporal context depends on the existing or future project/activity. If there is an overlap in time from an effects perspective, then it is included.

Cumulative effects from an aquatic species and habitat perspective overlap considerably with water quality (peak/base flows, sediment) cumulative effects because most of the attributes analyzed by the hydrologist are directly related to aquatic habitat conditions.

Table 58. Summary of past, present, and reasonably foreseeable future actions which may contribute to cumulative effects to aquatic fauna and habitat for the no action and proposed action alternatives

Project	Potential Effects	Overlap in time	Overlap in space	Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Stream Habitat Effects
Existing Old Forest Service Timber Harvest Units	Large Wood Recruitment Potential; Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition.	Yes	Yes	Not Likely	Projects completed. Removing large wood from stream channels was a common practice into the 1970's thus the amount of large wood in many streams within the action area have less large wood than historic conditions. None of the actions proposed in this EA would directly reduce existing levels of large wood in any stream. Indirect effects, associated with slight reductions in large wood recruitment potential, could result in localized reduction in recruitment along the Dog River pipeline corridor north of the 44 road and along a localized area on Brooks Meadow Creek that is adjacent to the pipeline corridor. This may result in a small decrease in large wood recruitment and thus less in stream wood for the next 50 years or more within those reaches.	All the habitat indicators for this project were either discountable, neutral, or insignificant. Some impact is possible in terms of rearing habitat to resident salmonids in reaches adjacent to the pipeline in Dog River and Brooks Meadow Creek. There would be no discernible impact downstream where ESA aquatic species and CH occurs.

Existing Old Forest Service Timber Harvest Units	Stream Temp	Yes	Yes	Not likely	After field validation of stream habitat in the action area, PDCs were developed by the inter-disciplinary team to minimize water quality impacts, including any from reduction of shade that may affect stream temperature. Some minor shade reduction may occur on perennial resident fish-only streams within the action area, but effects will be discountable at LFH due to the combination of pronounced distance (>2.5 miles), existing cold year-round temperature baseline, cold spring influence (4.5-10ºC summer contribution) from multiple tributaries downstream of the action, a retention of 0.5 cfs minimum instream flow during August -October, and the small fraction (~900') of canopy reduction as compared to intact riparian area in almost all of the action area.	All the habitat indicators for this project were either discountable, neutral, or insignificant. There is the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale but those will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects. There would be no discernible impact downstream where ESA aquatic species and CH occurs.
	Altered Peak/Base Flows	No	Yes	Not Likely	A reduction in forest canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. The quantity of water diverted from upper Dog River and its tributaries would remain unchanged from current conditions between early November and July, thus there will be **discountable** effects to peak flows in Dog River. The change in pipeline operations to maintain at least 0.5 cfs bypass flow at the diversion point from August 1 to October 31 is expected to result in a slight increase in base	Overall, there may be a slight **positive** effect from this project element below the diversion and at downstream in LFH from the increased base flow volume as compared to baseline (no bypass flows at diversion point). This is expected to have a slight benefit to resident trout individuals and their habitat as well as Coho and Chinook spawning habitat, as well as slightly increase rearing habitat (pool

					flow in LFH that is 3.4 miles downstream. There are no proposed changes to operations downstream of Crow Creek Reservoir, which is 7 miles upstream of LFH, thus there is **neutral** possibility of affecting baseline peak/base flow levels in LFH in SF Mill Creek.	depth) for steelhead, Coho and Chinook juveniles.
Existing Old Forest Service Timber Harvest Units	Sediment	Yes	Yes	No	The proposed project will result in disturbed soil in localized areas that has the potential to enter stream channels; primarily associated with diversion structure replacement/fish screening, material hauling, road maintenance, and AOP installation. Sediment/turbidity levels may be detectable at the site scale within resident fish only streams, but will be discountable at LFH due to multiple PDCs that minimize sediment mobilization, as well as the pronounced distance (>2.9 miles) between instream work and LFH.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects from turbidity and fine sediment levels in LFH were insignificant due to the extended distance (≥2.9 miles) of the project to LFH. There is the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale but those will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects. The installation of the AOP culvert as proposed will eliminate an active ford crossing thereby reducing potential turbidity and fine sediment at the site scale that will benefit resident

						fish species and habitat.
Timber harvests on federal, county and private lands including associated road/ landing construc-tion	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition. Change in Peak/Base Flows, Sediment	No	Yes	Not Likely	Projects completed. Although most previous timber harvest occurred decades ago riparian stands were treated more aggressively in many areas than current practices and thus the amount of standing wood remaining was less than desired conditions. These areas are still recovering (trees are still growing) and those less 40 years old in particular have yet to grow to a size where they would contribute meaningfully to riparian/stream habitat even if they were to fall. The riparian tree removal proposed in this EA would increase the riparian area that would not contribute as much large wood compared to no action.	Minimal cumulative effect throughout action area because the reduction in large wood recruitment potential resulting from proposed project would be quite small (less than 1 percent of Riparian Reserves affected). This reduction in large wood potential would not directly affect aquatic fauna or habitat; indirect effects could result in localized reductions in in-stream large wood and pool habitat quality and quantity.
Polallie Cooper Fuels Reduction Project	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank	Yes	Yes	Not Likely	An overlap in time and location may exist with other timber management on USFS managed land. There are PDC's in place that prevent measurable effects to the habitat indicators described above. Private and/or County timber activities in the Dog River and SF Mill Creek watersheds are limited in location and scale as the majority of both watersheds are federally managed. Therefore, the potential	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during

	Condition. Sediment				for effects to habitat indicators resulting from non-federal timber management are likely immeasurable at the 6th field scale.	project implementation at the site scale. Timber harvest activities within the Dog River and Mill Creek watershed could result in some direct localized effects to resident trout and aquatic mollusks but will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects.
	Altered Peak and/or Base Flows	Yes	Yes	Not Likely	A reduction in forest canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. The quantity of water diverted from upper Dog River and its tributaries would remain unchanged from current conditions between early November and July, thus there will be **discountable** effects to peak flows in Dog River. The change in pipeline operations to maintain at least 0.5 cfs bypass flow at the diversion point from August 1 to October 31 is expected to result in a slight increase in base flow in LFH that is 3.4 miles downstream. There are no proposed changes to operations downstream of Crow Creek Reservoir, which is 7 miles upstream of LFH, thus there is **neutral** possibility of affecting baseline peak/base flow levels in LFH in SF Mill Creek.	Overall, there may be a slight **positive** effect from this project element below the diversion and at downstream in LFH from the increased base flow volume as compared to baseline (no bypass flows at diversion point). This is expected to have a slight benefit to resident trout individuals and their habitat as well as Coho and Chinook spawning habitat, as well as slightly increase rearing habitat (pool depth) for steelhead, Coho and Chinook juveniles.

Forest Service Road 4400 Hazard tree Removal	Large Woody Debris Recruitment Potential, Stream temperature	Yes	Yes	Not Likely	An overlap in time and location may exist with other timber management on USFS managed land. There are PDC's in place that prevent measurable effects to the habitat indicators described above. Private and/or County timber activities in the Dog River and SF Mill Creek watersheds are limited in location and scale as the majority of both watersheds are federally managed. Therefore, the potential for effects to habitat indicators resulting from non-federal timber management are likely immeasurable at the 6th field scale.	Habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale. Timber harvest activities within the Dog River and Mill Creek watershed could result in some direct localized effects to resident trout and aquatic mollusks but will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects.
The Dalles Watershed Phase I and II Fuel Reduction	Large Wood Recruitment Potential	Yes	Yes	Unlikely	Removing large wood from stream channels was a common practice into the 1970's thus the amount of large wood in many streams within the action area have less large wood than historic conditions. None of the actions proposed in this EA would directly reduce existing levels of large wood in any stream. Indirect effects, associated with slight reductions in large wood recruitment potential, could result in localized reduction in recruitment along the Dog River pipeline corridor north of the 44 road and	A reduction of large wood recruitment could result in fewer pools and some reduction in channel stability because one of the major roughness elements that forms and maintains habitat is large wood. All the habitat indicators for this project were either discountable, neutral, or insignificant.

					along a localized area on Brooks Meadow Creek that is adjacent to the pipeline corridor. This may result in less large wood recruitment and thus less in stream wood for the next 50 years or more within those reaches.	Some impact is possible in terms of rearing habitat to resident salmonids in reaches adjacent to the pipeline in Dog River and Brooks Meadow Creek. There would be no discernible impact downstream where ESA aquatic species and CH occurs. A negligible impact to aquatic macrointertebrate populations as a whole, but some localized habitat degradation possible. Therefore, effects to aquatic species were insignificant at the 12th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks at the site scale.
Road Decommis-sioning and Closures	Sediment	Yes	Yes	Not likely	After field validation of stream habitat in the action area, PDCs were developed by the inter-disciplinary team to minimize water quality impacts.	All the habitat indicators for this project were either discountable, neutral, or insignificant. Some impact is possible in terms of rearing habitat to resident salmonids in reaches adjacent to the pipeline in Dog River and Brooks Meadow Creek. There would be no discernible impact downstream where ESA

						aquatic species and CH occurs.
National Forest System road and trail mainten-ance activities	Sediment	Yes	Yes	No	The proposed project will result in disturbed soil in localized areas that has the potential to enter stream channels; primarily associated with diversion structure replacement/fish screening, material hauling, road maintenance, and AOP installation. Sediment/turbidity levels may be detectable at the site scale within resident fish only streams,but will be discountable at LFH due to multiple PDCs that minimize sediment mobilization, as well as the pronounced distance (>2.9 miles) between instream work and LFH.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects from turbidity and fine sediment levels in LFH were insignificant due to the extended distance (≥2.9 miles) of the project to LFH. There is the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale but those will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects.

The Dalles Fuels Reduction Project	Change in Peak/Base Flows	Yes	Yes	No	A reduction in forest canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. There could be an increase in diversion during the late fall and early winter due to larger diameter pipe. But it would only be when there is a higher amount of flow available. In other words, diversion would not be increased, only capacity to capture more when it's there. Thus there will be **discountable** effects to peak flows in Dog River. The change in pipeline operations to maintain at least 0.5 cfs bypass flow at the diversion point from August 1 to October 31 is expected to result in a slight increase in base flow in LFH that is 3.4 miles downstream. There are no proposed changes to operations downstream of Crow Creek Reservoir, which is 7 miles upstream of LFH, thus there is **neutral** possibility of affecting baseline peak/base flow levels in LFH in SF Mill Creek.	Overall, there may be a slight **positive** effect from this project element below the diversion and at downstream in LFH from the increased base flow volume as compared to baseline (no bypass flows at diversion point). This is expected to have a slight benefit to resident trout individuals and their habitat as well as Coho and Chinook spawning habitat, as well as slightly increase rearing habitat (pool depth) for steelhead, Coho and Chinook juveniles.

The Dalles Fuels Reduction Project	Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition.	Yes	Yes	No	An overlap in time and location may exist with this project. PDC's were in place during the Watershed Fuels reduction that prevent measurable effects to these habitat indicators.	None
Ongoing City of The Dalles Operations in the Municipal Watershed	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition. Sediment, Peak/Base Flows	Yes	Yes	Not Likely	An overlap in time and location may exist with this project. The City has PDC in place that prevent measurable effects to the habitat indicators described above.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale.
Dufur Mill Road (44) and USFS Road 17 Mainten-ance	Habitat Indicators	Yes	Yes	No	An overlap in time and location may exist with this project. Trail projects and this project have PDC's in place that prevent measurable effects to the habitat indicators described above. Treating weeks may be beneficial to some of the habitat indicators described above.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic

						mollusks during project implementation at the site scale. Trail maintenance has no causal relationship that would accumulate localized effects to resident fish or aquatic mollusks and may be beneficial at the 6th field scale.
Surveyors Ridge and Other Ongoing Trail Mainte-nance	Habitat Indicators	Yes	Yes	No	An overlap in time and location may exist with this project. Weed maintenance projects and this project have PDC's in place that prevent measurable effects to the habitat indicators described above. Managing invasive weeds will be beneficial to the habitat indicators described above.	None
Specific Noxious Weeds Treatments		Yes	Yes	None	None	None
Trail relocations (Dog River Trail #675, Cooks Meadow Trail #639, Surveyor's Ridge Trail #688)	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition. Sediment	Yes	Yes	Not Likely	An overlap in time and location may exist with this project. Both the trail relocation project and this project have PDC's in place that prevent measurable effects to the habitat indicators described above..	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale. Roadside sanding at highway 35 would not measurably accumulate effects to resident fish or aquatic mollusks.

Highway 35 road Mainten-ance and Sanding	Sediment	Yes	Yes	Not Likely	The proposed project will result in disturbed soil in localized areas that has the potential to enter stream channels; primarily associated with diversion structure replacement/fish screening, material hauling, road maintenance, and AOP installation. Sediment/turbidity levels may be detectable at the site scale within resident fish only streams, but will be discountable at LFH due to multiple PDCs that minimize sediment mobilization, as well as the pronounced distance (>2.9 miles) between instream work and LFH	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale.
Developed and Dispersed Camping	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Peak/Base Flows, Streambank Condition. Sediment	Yes	Yes	No	An overlap in time and location may exist with this project. Developed and dispersed recreation is managed to prevent measurable effects to the habitat indicators described above.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale. Recreation has causal relationship that would accumulate effects to resident fish or aquatic mollusks.

3.4.3 Consistency Determination

The Dog River Pipeline Project is consistent with all applicable fish/aquatic related federal law, plans, and guidelines as outlined below.

Law, Regulation & Policy

The Mt. Hood National Forest Plan and the Northwest Forest Plan provide guidance for projects in the form of Standards and Guidelines and recommended Best Management Practices (BMP). There is overlap between aquatics and water quality in terms of applicable standards and guidelines; therefore, those listed below are directly related to fisheries, or other aquatic special status species. The other water quality standards can be found in the Hydrology specialist report.

Mt. Hood Forest Plan Standards and Guidelines include (pages Four-64, Four-69, Four-257–258):

Fisheries: FW-137, -138, -139, -145, -147

Threatened, Endangered and Sensitive Plants and Animals: FW-174, -175, -176

B7 General Riparian Area: B7-028, -030, -031, -032, -033, -037, -038, -059

Northwest Forest Plan Standards and Guidelines include:

Riparian Reserve Standard and Guides and Aquatic Conservation Strategy (ACS)

In addition to the above, the Forest Service is required to assess and disclose the effects of any Federal action on Regional Forester's special status species, as outlined in the Endangered Species Act of 1973 and National Forest Management Act of 1976 (see effects determination section). The Magnuson-Stevens Fishery Conservation and Management Act of 1976 requires the Forest Service to assess and disclose the affects to Essential Fish Habitat. Clean Water Act compliance and consistency with the standard and guidelines outlined in the Northwest Forest Plan Aquatic Conservation Strategy objectives determination is provided for in this analysis and is also discussed in the Hydrology specialist report.

Desired Future Condition

The desired future condition (DFC) for streams and associated riparian areas within the Dog River Project Area is summarized in several sources as outlined below:

The NWFP Aquatic Conservation Strategy (ACS) was developed"…to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands." Within the strategy are nine ACS objectives that give direction regarding maintenance and/or restoration of aquatic processes key to watershed health. These objectives can be considered desired future conditions from an aquatics perspective for the project area and are described and discussed below.

Finally, the Forest Plan presents desired future conidtions for all management areas, including General Riparian Areas. The list of DFC can be found on pag3e Four-254 in the LRMP, and the General Riparian Area management goal is to "…achieve and maintain riparian and aquatic habitat conidtions for the sustained, long-term production of fish, selected wildlife and plant species, and high quality water for the full spectrum of the Forest's riparian and aquatic areas.

Survey and Manage

This project is consistent with the survey requirements in the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA and BLM).

Aquatic Conservation Strategy

In order for a project to proceed, "a decision maker must find that the proposed management activitiy is consistant with the Aquatic Conservation Strategy objectives" (ROD B-10) from the Northwest Forest Plan Record of Decision. The nine objectives are listed on page B-11 of the ROD. Portions of the effects analysis in this document focus on key parameters or indicators that make of elements of the nine ACS objectives, to determine if the project would restore, maintain, or degrade these indicators. Once this determination is made, the indicators are examined together with the Range of Natural Variability to ascertain whether the project is consistent with the objectives. A description of the range of natual variability from the Watershed Analysis are included in the "Existing Conditions" section of this report and the Hydrologist Specialist Report. The following table displays specific indicators that comprise the ACS objectives and the effects section that covers this indicator in the Environmental Assessment. Also, refer to the Fisheries Biological Assessment for additional effects descriptions.

The following table displays the individual indicator and the effect the alternative have on those indicators at the 5th, 6th, and 7th field watershed scale. Fifth field watersheds are generally large in size (40,000 acres to 250,000 acres), while 6th and 7th field watersheds are smaller (5,000 acres to 40,000 acres and 2,000 acres to 5,000 acres respectively).

Table 59. ACS Objective Indicators in the EA.

Indicators	**Analysis Found in the Effects Section of the EA**
Water Temperature	Hydrology, Fisheries
Sediment	Soil Productivity, Water Quality, Fisheries
Contaminents	Hydrology. Fisheries
Physical Barriers	Hydrology, Fisheries
Substrate	Fisheries
Large Woody Debri	Fisheries
Pool Frequency	Fisheries
Pool Quality	Fisheries
Off-Channel Habitat	Fisheries
Refugia	Fisheries
Width/Depth Ratio	Fisheries
Streambank Condition	Hydrology, Fisheries
Floodplain Connectivity	Hydrology, Fisheries
Peak/base Flows	Hydrology, Fisheries
Drainage Network Increase	Hydrology
Riparian Reserves	Hydrology, Fisheries

Table 60. ACS Objective Indicators for each Alternative.

Indicators	Effects - No Action	Effects - Proposed Action
Water Quality:		
Temperature	M	M
Sediment	M	M
Chemical Contamination	M	M
Habitat Access:		
Physical Barriers	D	R – due to culvert replacement
Habitat Elements:		
Substrate	M	M
Large Woody Debris	M	M
Pool Frequency	M	M
Pool Quality	M	M
Off-Channel Habitat	M	M
Refugia	M	M
Channel Conditions and Dynamics:		
Width/Depth Ratio	M	M
Streamback Condition	M	M
Floodplain Connectivity	M	M
Flow/Hydrology:		
Peak/Base Flows	M	Slight restore (R) in Dog River, M in South Fork Mill
Drainage Network Increase	M	M
Watershed Condition:		
Riparian Reserves	M	M

Note: The abbreviations in the table are defined as R=Restore which means the actions(s) would result in acceleration of the recovery rate of the indicator; M=Maintain which means that the function of an indicator does not change by implementing the action(s) or recovery would continue at its current rate; and D=Degrade which means changing the function of the indicator for the worse.

3.5 Visual Qualities

3.5.1 Existing Condition

Scenic Context for Planning Area

The terrain along the existing pipeline corridor is mostly forested with gently rolling hills. Three miles of the pipeline falls along the Surveyors Ridge Trail #688. This portion of the pipeline corridor as well as the vast majority of the remainder of the existing pipeline corridor is bordered by mature trees. Where the trail and the pipeline overlap, the trail tread averages about 24” wide. Most human activity along the corridor occurs where it overlaps with Surveyors Ridge Trail. The remainder of the corridor likely receives the highest amount of human use for pipeline maintenance. The overstory along the pipeline corridor is comprised of mixed conifer forest (Douglas-fir, grand fir, and ponderosa pine. There is little understory throughout the project area due to the density of the existing stand along the pipeline.

Human effects are noticeable throughout the project area as a result of the establishment and maintenance of the pipeline. Fire suppression over the past 100 years has led to lower species diversity and fewer openings in the stands adjacent to the pipeline, making visibility outside of the corridor difficult.

Visual Management Areas and Scenic Viewshed (B2)

Table 61. Visual Quality Objectives (VQOs 1) by Management Area.

		Distance Zone from Viewer Position		
Management Areas	Approximate Percentage of Project Area	Foreground	Middleground	Background
Scenic Viewshed (B2)	48%	Management Area Standards and Guidelines specific to Dufur Mill Road Scenic Viewshed	Management Area Standards and Guidelines specific to Dufur Mill Road Scenic Viewshed	Management Area Standards and Guidelines specific to Dufur Mill Road Scenic Viewshed
Wood Product Emphasis (C1)	38%	Modification	Modification	Modification
Special Emphasis Watershed (B6)	14%	Modification	Modification	Modification

Dufur Mill Road Scenic Viewshed (FSR 4400)

The Dog River Pipeline crosses Dufur Mill Road approximately 1200 feet south of the road’s intersection with FSR 1700. The pipeline crosses the road here and possibly runs parallel to the western edge of the road for less than 500 feet. The pipeline corridor itself is not easily visible from the road although it is approximately 90 feet west of the edge of the roadway, as it is screened by dense conifers and is at least 10 feet below the road grade of Dufur Mill Road.

The viewshed from the portion of the Dufur Mill Road which falls within the project area is heavily vegetated. Views beyond the shoulders of the road are blocked by this vegetation. The topography of this portion of the roadway also prohibits extended views. West of the road, the surrounding area is below road grade, while east of the road is steeper and above grade.

Overall, the views from this designated viewshed are of scenically attractive landscape dominated by natural line, colors, textures and forms. It is a thickly forested landscape with some signs of human activity stemming from trail intersections and signs of old timber sales further east, and outside of the project area. Some short portions of the road where previous harvest occurred, and trail intersections, meet a partial retention Visual Quality Objective (VQO) and not the prescribed retention VQO. However the majority of the road meets the prescribed retention VQO for the foreground (within ½ mile of the roadway), partial retention VQO for the mid-ground (1/2 mile – 5 miles from the roadway), and partial retention for the background (more than 5 miles from the roadway).

Project Area Trails

Surveyors Ridge Trail #688 intersects with the planning area. Visual sensitivity levels of the trail are classified by the Mt. Hood National Forest Plan. Within these sensitivity levels visual quality objectives are prescribed for foreground, far foreground, and middleground.

Designated Trails within the Planning Area

As a sensitivity level II trail intersecting the project area, Surveyors Ridge Trail currently has well established trail tread with few visible impacts along the trail. It is meeting the prescribed partial retention VQO for the visible foreground (660 feet from each side of the trail unless screened by topography.) The modification VQO is prescribed for both the far foreground (660 beyond the first 660 feet) and middleground (anything visible beyond 1,320 feet from each side of the trail.)

Approximately 2.7 miles of Surveyors Ridge Trail is located on top of the Dog River Pipeline. Surveyors Ridge Trail is 12.7 miles in its entirety. The portion of the trail collocated with the pipeline is also an access road for pipeline maintenance. Small portions appear to be a dirt road, but the majority of the trail collocated with the pipeline has grown in quite a bit. There is a lot of vegetative screening and trees have encroached along the edges of the roadway creating screening and shade.

A short portion of the trail follows somewhat parallel to FSR 44. The trail is not visible from FSR 44 due to the screening of trees and vegetation that have grown along the edge of the trail.

Wood Product Emphasis and Special Emphasis Watershed (C1 & B6)

While managed for different purposes, lands under these two management areas share a modification VQO for all distance zones. There has been a significant amount of past timber harvest activity within these management areas, and the effects of harvest activity are often visually evident. This harvest activity has created opportunities for viewing distant peaks in some places, which is noted as a desired condition in the Forest Plan. These harvested stands are generally not visible from the Scenic Viewshed (B2) within the project area due to vegetative screening.

Other human modifications to the landscape include a network of non-motorized trails. There are also unofficial dispersed campsites within these management areas. While human modifications are present within these management areas they remain visually subordinate to the natural landscape, and these areas currently meet the prescribed modification VQO.

3.5.2 Effects Analysis

No Action Alternative

There would be no direct effects as a result of implementing the No Action alternative. An indirect effect from implementing the No Action alternative would be the deterioration of the pipeline to the point that major excavation would need to be done along the pipeline corridor. Heaviest visual impacts of this work would occur along Surveyor's Ridge Trail or Dufur Mill Road Scenic Viewshed. If major repairs were needed under these circumstances, it could be difficult to maintain desired VQOs.

Proposed Action Alternative

Pipeline Installation

Impacts would occur along the existing pipeline. Along the majority of the pipeline corridor, many mature trees and dead wood line the 25 foot right-of-way, which has grown in significantly over the years. The removal of this material would significantly alter the right-of-way. This change would not lead to a deviation from prescribed VQOs in most locations, as the desired VQO is modification. However, where the pipeline overlaps the trail, the prescribed VQO is partial retention. As a mitigation to the Proposed Action, Surveyors Ridge Trail has been rerouted so that the trail no longer overlaps the pipeline right-of-way for 2.7 miles. There is now one location where the trail intersects with the pipeline. This mitigation would reduce the magnitude of these effects and ensure that the Proposed Action remain consistent with prescribed VQOs.

The prescribed VQO of retention would be impacted where the pipeline crosses Dufur Mill Road. Currently, dense vegetation screens the view of the pipeline. Implementation of the project and maintenance of a 25 foot corridor resulting in the removal of a 25 foot band of vegetation perpendicular to the viewshed would have a negative impact on the desired VQO of retention. Visual impacts to the east of the road would be minimized due to topography. West of the road, the landscape is below the road grade, which would make the view of the pipeline corridor more noticeable. According to the Forest Plan, structures and improvements may be provided within scenic viewsheds in order to protect resource values, for administrative purposes, and to accommodate recreational use. The Dog River Pipeline is needed for administrative purposes for the City of The Dalles.

The Proposed Action would affect the scenic integrity of the landscape surrounding the pipeline. There would be a noticeable change in the width of the right-of-way, which would not only occur during implementation, but also be maintained for the lifetime of the pipeline. Throughout the majority of the project area this impact would not lead to a deviation from the prescribed VQO which is modification. For the portion of the project area that intersects with Dufur Mill Road, there would be a deviation from the retention VQO. According to the Forest Plan, structures and improvements may be provided within scenic viewsheds in order to protect resource values, for administrative purposes, and to accommodate recreational use.

Staging Areas

There are five possible staging areas that could be used for staging pipe, sand/gravel, and materials under the Proposed Action. Visual impact from the southern-most staging area along the 4400-11, would not be visible from the Dufur Mill Road due to vegetative and topographic screening. The other two proposed staging areas are located within land use allocations with prescribed VQO of modification, allowing for activities to visually dominate the characteristic landscape. The staging areas would be utilized during implementation and then returned to their previous condition, ensuring that impacts would be short-term.

Cumulative Effects

The items documented in Table 1 were considered when analyzing cumulative effects for visual quality. These items were analyzed as a result of their proximity to the planning area and their potential to have an effect on visual quality. The spatial context of the cumulative effects analysis lies within one mile of any portion of the proposed pipeline replacement.

Under the Proposed Action, these items could have an impact on the planning area. Combined with the Proposed Action, these actions would not deviate from Forest Plan standards.

3.5.3 Consistency Determination

All of the proposed alternatives described in this report would be in compliance with Mt. Hood Forest Plan and the Forest Service Manual.

Table 62. Consistency with Forest Plan Standards and Guidelines.

Standards & Guidelines	Relevant Elements of Proposed Action	Consistency of the Proposed Action with the Forest Plan
FW-586: Sensitivity Level II trails shall have prescribed VQOs of Partial Retention, Modification, and Modification in near foreground, far foreground and middleground distance zones, respectively.	The degree to which the Proposed Action maintains prescribed VQOs.	The Proposed Action would be consistent with the Forest Plan provided mitigations were implemented. Specifically: The Surveyors Ridge Reroute Decision memo reroute which addresses impacts to VQOs.
FW-584 Trail VQOs shall be prescribed for near foreground, far foreground and middleground based on trail sensitivity level. Prescribed trail VQOs apply to both existing trails and planned trails.	The degree to which the Proposed Action maintains prescribed VQOs.	The Proposed Action would be consistent with the Forest Plan provided mitigations were implemented. Specifically: The Surveyors Ridge Reroute Decision memo reroute which addresses impacts to VQOs.
FW-556 The prescribed VQO should be achieved within one year after completion of any project activities.	Activity debris, staging areas, piling, and tree marking.	The Proposed Action would be consistent with the Forest Plan provided mitigations which address project impacts (i.e. equipment disturbance, tree marking, etc.) rehabilitation were implemented.

Standards & Guidelines	Relevant Elements of Proposed Action	Consistency of the Proposed Action with the Forest Plan
FW-552 The VQOs prescribed in management direction represent the minimum level that shall be achieved in long term visual resource management	The degree to which the Proposed Action maintains prescribed VQOs.	This effects analysis addresses this Standard and Guideline.
C1-007 Management activities shall achieve a VQO of Modification as viewed from open roads; local roads and temporary roads are exceptions	The degree to which the Proposed Action maintains prescribed VQOs.	This effects analysis addresses this Standard and Guideline.
B6-011 VQOs accepting less visual quality disturbance shall be applied when B6 Management Areas are located within “designated viewsheds” (Dufur Mill Road) (R PR PR)	The degree to which the Proposed Action maintains prescribed VQOs within the Dufur Mill Road viewshed.	This effects analysis addresses this Standard and Guideline.
B6-010 Management activities shall achieve a VQO of modification from open roads	The degree to which the Proposed Action maintains prescribed VQOs.	This effects analysis addresses this Standard and Guideline.

Standards & Guidelines	Relevant Elements of Proposed Action	Consistency of the Proposed Action with the Forest Plan
B2-012 Management activities shall achieve prescribed VQOs from the identified viewer positions	Proposed activity within the Dufur Mill Road Scenic Viewshed.	The Proposed Action would be consistent with the Forest Plan provided mitigations were implemented. Specifically: • The pipeline corridor would be visually subordinate along FSR 44. As many trees as possible would be retained along the FSR 44 corridor to maintain a visual buffer between the road and the pipeline corridor. • Decks of trees would be visually subordinate along the pipeline corridor adjacent to FSR 44. • Piles would be visually subordinate along the pipeline corridor adjacent to FSR 44. They would be burned within 2 years of contract termination. • Tree stumps will be visually subordinate along the pipeline corridor adjacent to FSR 44. Stump heights will be maintained at heights of 6 inches or less within Foreground (up to ½ mile) and be angled away from the roadway. • Tree paint would not be visible from the roadway along FSR 44.
B2-001: Structures and improvements may be provided to protect resource values, for administrative purposes, and to accommodate recreational use	Installation of a modern pipeline with a 25 foot right-of-way.	The pipeline installation and maintenance of the modern right-of-way corridor would be consistent with the Forest Plan as the pipeline is needed for administrative purposes for The City Of The Dalles.

3.5.4 Summary of Effects

There would be no direct effects to scenic resources under the No Action alternative. The Proposed Action alternative would reduce and even eliminate vegetative screening along a short section of FSR 44 where the pipeline crosses the road within the Dufur Mill Road Scenic Viewshed. This would have a negative effect on VQOs, however, it would not deviate from Forest Plan Standards as structures and improvements may be provided within scenic viewsheds for administrative purposes. The reroute of the Surveyors Ridge Trail 688 would maintain VQOs along the trail corridor. Direct visible human effects within the scenic viewshed would include stumps, staging areas, slash piles and tree marking. The Proposed Action includes mitigations to address these visual effects of actions commensurate with the retention VQO.

The Proposed Action would improve the efficiency of the Dog River Pipeline and maintain a modern right-of-way along the pipeline corridor. The modern right-of-way could be unattractive to some visitors, but others may enjoy it for access for non-motorized recreation. The No Action alternative would not result in any changes to the viewshed or right-of-way corridor.

In the short-term the Proposed Action would have a negative effect on the retention VQO within the Scenic Viewshed (B2) management area. The Proposed Action would not affect VQOs within the Wood Product Emphasis (C1) or Special Emphasis Watershed (B6) management areas. In the long term (10+ years) the No Action alternative would not impact the VQOs for these three management areas. The Proposed Action alternative would maintain VQOs for the Wood Product Emphasis (C1) and Special Emphasis Watershed (B6) management areas, and decrease retention VQOs along the pipeline corridor within the Scenic Viewshed (B2) management area due to the administrative need of The City Of The Dalles. The area of impact to the retention VQO from FSR 44 would be minimal, although it’s impact would last the duration of the maintenance of the pipeline corridor.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6 Wildlife

This section is organized into six sections: *Threatened, Endangered and Proposed Species – Northern Spotted Owl; Northern Spotted Owl Critical Habitat; Region 6 Sensitive Species – Gray Wolf, Fringed Myotis, Western Bumblebee, Johnson's Hairstreak; Management Indicator Species – Deer, Elk, Pileated Woodpecker, American Marten, Wild Turkey, Western Gray Squirrel; Snag and Down Log Associated Species; and Neotropical Migratory Birds*. The existing condition, effects analysis, consistency determination, and summary or effects are discussed for each.

3.6.1 Threatened, Endangered and Proposed Species – Northern Spotted Owl

Existing Condition

There are three historic spotted owl territories that overlap the project boundary. All of these home ranges are currently below the threshold of 40 percent suitable habitat and are below 50 percent suitable habitat within the core area. Surveys have been conducted in the project area since 2010 and one spotted owl was detected in 2011. Follow-up visits did not relocate this owl and no other owls have been found. The historic nesting sites are currently considered unoccupied. A first year male spotted owl was detected during surveys for a project adjacent to the proposed pipeline on two separate occasions in August of 2015. The owl was not detected again in subsequent visits and therefore the status of that owl is unknown.

Effects Analysis

No Action Alternative

There would be no short-term effects to spotted owls under this alternative. In the short-term, the portion of the proposed pipeline that is providing dispersal and suitable habitat would continue to function as dispersal and suitable habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the trees along the proposed pipeline could start to differentiate to varying degrees and show an increase in the levels of snags and down wood as live trees continue to die. The quality of habitat would improve only slightly in some stands while improving more in others depending on site conditions.

Proposed Action Alternative

The proposed project is expected to have disturbance to the spotted owl from all phases of pipeline construction. Specifically the disruption will be from chainsaws and heavy equipment. No spotted owls have been found during surveys. If the potential nest sites are unoccupied, then there would be no effect from disturbance to spotted owls from the proposed activities. If a spotted owl nest is found during surveys, that nest patch would be buffered and timing restrictions would be placed on activities that would take place within the disruption distance as defined in Table 63. Because timing restrictions would be in effect in the event that a nest is found, the disturbance from the Proposed Action **may affect, but is not likely to adversely affect** spotted owls.

Table 63. Disturbance and Disruption Distances for Northern Spotted Owls.

Disturbance Source	No Effect (March 1 – September 30.)	Disturbance Distance Entire Breeding Period (March 1 – September 30). NLAA (not likely to adversely affect)	Disruption Distance[1] Critical Breeding Period (March 1 – July 15). LAA (likely to adversely affect)	Disruption Distance[1] Latter Breeding Period (July 16 – September 30). LAA (likely to adversely affect)
Use of chainsaws	> 0.25 mile	66 yards to 0.25 mile	≤ 65 yards	No Disruption Anticipated
Use of heavy equipment	> 0.25 mile	66 yards to 0.25 mile	≤ 65 yards	No Disruption Anticipated
Hauling on open roads	> 0.25 mile	≤ 0.25 mile	No Disruption Anticipated	No Disruption Anticipated
Blasting	> 1 mile	0.25 mile to 1 mile	≤ 0.25 mile	≤ 100 yards (injury)
Helicopter – Type I[2]	> 0.5 mile	266 yards to 0.5 mile	≤ 265 yards	≤ 100 yards (hovering only)
Helicopter – other[3]	> 0.25 mile	111 yards to 0.25 mi	151 yards to 0.25 mile	≤ 50 yards (hovering only)
Rock crushing		440 yards (0.25 mile)	180 yards	No Disruption Anticipated
Burning	> 1 mile	0.25 mile to 1 mile	≤ 0.25 mile	No Disruption Anticipated

1. Noise distances were developed from a threshold of 92 dB (USFWS 2003). Smoke disturbance distances are based on a FWS white paper (USFWS 2008b). Distances are measured from occupied spotted owl nest tree or fledgling location. If these are not identified, distances are from the edge of nest patch (for both known and potential spotted owl sites.
2. Type I helicopters seat at least 16 people and have a minimum capacity of 5,000 lbs. Both a CH 47 (Chinook) and UH 60 (Blackhawk) are Type I helicopters. Kmax helicopters are considered "other" for the purposes of disturbance. Sound readings from Kmax helicopter logging on the Olympic NF registered 86 dB at 150 yards (Piper 2006).
3. All other helicopters (including Kmax).

Tree removal included in the Proposed Action would be in the form of a 3.4 mile long, 25 foot wide corridor of approximately 10.3 acres. Of these approximate 10.3 acres, roughly 6.1 are in suitable habitat and roughly 4.2 are in dispersal habitat. Within the home ranges, roughly 3.9 acres would be removed from territory 10119P92, roughly 7.8 would be removed from 6035P94, and approximately 4.2 acres would be removed from 6102P90 (Table 64). This habitat removal would not impact the ability of owls to utilize this habitat at the stand scale since the trees that would be removed are spread out across a long narrow corridor rather than in one patch and the function of the habitat within each stand would remain unchanged.

Table 64. Approximate Acres Impacted within Territories.

	1101P92	6035P94	6102P90
Acres Suitable Removed	3.9	5.4	1.2
Acres Dispersal Removed	0	2.4	3.0
Total	3.9	7.8	4.2

Because the portion of the project that removes trees in dispersal habitat is spread over a 1.4 mile length, the Proposed Action would not impact the ability of spotted owls to disperse across the landscape and would not change the function of dispersal habitat at the stand scale. Therefore the removal of approximately 4.2 acres of dispersal habitat **may affect but is not likely to adversely affect** spotted owls. Future nesting opportunities would be reduced by removing large trees and snags within suitable habitat and territories that are currently below threshold levels would have habitat removed, therefore, the removal of approximately 6.1 acres is **likely to adversely affect** spotted owls. Because the tree removal is along a narrow corridor, the function of the habitat within these stands would remain unchanged.

The small mammal species that have been found to increase most after tree removal are not ones that are selectively favored by barred owls more than spotted owls. Based on these studies, the proposed pipeline construction would not be expected to expand the range of barred owls since the function of the habitat at the stand scale would remain unchanged.

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable) was considered in this cumulative effects analysis because the activities overlap in time and space. There is a potential cumulative impact to suitable habitat from the removal of approximately 6 acres of suitable owl habitat. However, this cumulative impact would be minor because the removal of approximately 6 acres represents 0.2% of the available suitable habitat on the landscape. Additionally, cumulative effects to dispersal habitat would not prevent spotted owls from continuing to forage or disperse throughout the analysis area because the 4.2 acres proposed for removal are minor compared to the stand scale. In conclusion, cumulative effects would be minor because the overall function of the northern spotted owl's habitat at the stand-scale would remain unchanged.

Consistency Determination

Late Successional Reserve (LSR) Assessment

The Regional Ecosystem Office (REO) and the interagency Late-Successional Reserve Work Group has reviewed the Surveyors Ridge Late-Successional Reserve Assessment (Assessment). The REO found that the Assessment provided sufficient framework and context for projects and activities within the LSR, including the Dog River Pipeline replacement. A memorandum dated July 23, 1997 stated that specific projects described in the Assessment that are consistent with the Standards and Guidelines and the treatment criteria identified are exempted from project-level REO review.

Recovery Actions 10 and 32

The proposed project is consistent with the Northwest Forest Plan and with the Revised Northern Spotted Owl Recovery Plan (USFWS 2011).

- *Recovery Action 10*: Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl populations.
    - The proposed project does not impact the highest quality.
- *Recovery Action 32*: Because spotted owl recovery requires well distributed, older and more structurally complex multi-layered conifer forests on Federal and non-federal lands across its range, land managers should work with the Service to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees.
    - The proposed project was developed in coordination with the Fish and Wildlife Service (FWS) and does not impact and RA 32 habitat.

Consultation

A formal Programmatic Biological Assessment (BA) that included the Dog River Pipeline replacement was submitted to the FWS for the effects to federally listed species including northern spotted owls. The Biological Opinion on the Effects of Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls within the Willamette Province, FY 2017, proposed by the Mt. Hood National Forest; and Willamette National Forest; on the Northern Spotted Owl and its' Designated Critical Habitat (FWS Reference Number 01EOFW00-2017-F-0045 and 17-14) was received in August 2017.

Summary of Effects

While the proposed project is expected to have disturbance to the spotted owl from all phases of pipeline construction, no spotted owls have been found during surveys. If the potential nest sites are unoccupied, then there would be no effect from disturbance to spotted owls from the proposed activities.

Tree removal **may affect but is not likely to adversely affect** spotted owls. Future nesting opportunities would be reduced by removing large trees and snags within suitable habitat and territories that are currently below threshold levels would have habitat removed, therefore, the removal of approximately 6.1 acres is **likely to adversely affect** spotted owls. Because the tree removal is along a narrow corridor, the function of the habitat within these stands would remain unchanged.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.2 Northern Spotted Owl Critical Habitat

Existing Condition

Critical Habitat in the Action Area

Of the 10.3 acres of tree removal for the pipeline, 8.8 acres are in critical habitat. Of the 8.8 acres in critical habitat, 3.7 acres are providing only dispersal habitat (Physical or Biological Feature [PBF] 4) and

5.1 acres are providing suitable habitat for spotted owls (PBF 2, 3 and 4). These PBFs in the action area are functioning at a landscape scale and could support up to 8 territories.

Subunit East Cascade North 7

The Proposed Action is within East Cascades North (ECN), subunit ECN 7. Of the 139,983 acres in this unit, approximately 139,865 are located on the Mt. Hood NF. This unit is located in Wasco and Hood River Counties on the east side of the Cascades with a small portion in Clackamas County on the west side of the Cascades. There are approximately 8.8 acres of critical habitat proposed for removal.

There are approximately 58,397 acres of suitable habitat within subunit ECN 7. Based on the amount of habitat and the average home range size for this Province, this subunit could potentially support up to 48 territories. Of these territories, 3 overlap habitat within the action area.

Special management considerations or protections are required in this subunit to address threats from current and past timber harvest, removal or modification of habitat by forest fires and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between other subunits and critical habitat units.

Effects Analysis

The analysis area for spotted owl critical habitat includes the Dog River Pipeline project boundary and a 1.2 mile buffer to include any territories that may overlap.

No Action Alternative

There would be no short-term effects to spotted owl critical habitat under this alternative. In the short-term, dispersal habitat (Physical or Biological Features [PBF] 4) would continue to function as dispersal habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the stands could start to differentiate to varying degrees and show an increase in the levels of small snags and small down wood. Stands that are functioning as suitable habitat (PBF 2) would continue to function as suitable habitat.

Proposed Action Alternative

Tree removal in critical habitat would be in the form of an approximate 2.9 mile long, 25 foot wide corridor for a total of 8.8 acres. Of the total acres, approximately 5.1 are in suitable habitat (PBFs 2 and 3) and approximately 3.7 acres are in dispersal habitat (PBF 4). This habitat removal would not impact the ability of owls to utilize this habitat at the stand scale since the trees that would be removed are spread out across a long narrow corridor rather than in one patch and the function of the habitat within each stand would remain unchanged.

Because the portion of the project that removes trees in dispersal habitat is spread over a roughly 1.4 mile length, the Proposed Action would not impact the ability of spotted owls to disperse across the landscape and would not change the function of dispersal habitat at the stand scale. Therefore the removal of approximately 3.7 acres of dispersal habitat **may affect but is not likely to adversely affect** spotted owls. Future nesting opportunities would be reduced by removing large trees and snags within suitable habitat and territories that are currently below threshold levels would have some habitat removed, therefore, the removal of approximately 5.1 acres is **likely to adversely affect** spotted owls. Because the tree removal is along a narrow corridor, the function of the habitat within these stands would remain unchanged.

The Proposed Action maintains the PBFs in a manner that meets the life history needs of the spotted owl at the stand-scale, therefore it would not have significant adverse impacts at the subunit or unit scale.

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable) was considered in this cumulative effects analysis because the activities overlap in time and space.

Timber harvest on federal lands has reduced the amount of suitable and dispersal habitat (PBFs 2, 3, and 4) on the landscape and will continue to do so into the future until these stands grow over time and become habitat again. With less suitable habitat on the landscape, there are fewer opportunities for spotted owls to successfully nest and produce young. The cumulative effects to dispersal habitat would not prevent spotted owls from continuing to forage or disperse throughout the analysis area.

Consistency Determination

The Proposed Action is consistent with the Critical Habitat (CH) Rule that relies on the recommendations laid out by the Recovery Plan for the spotted owl. The proposed project is not considered active forest management, does not impact the function of PBFs at the stand scale, would not impact the ability of owls to exist on the landscape, and would not preclude the recovery of the species.

Consultation

A formal Programmatic Biological Assessment (BA) that included the Dog River Pipeline replacement was submitted to the Fish and Wildlife Service (FWS) for the effects to federally listed species including northern spotted owls and their critical habitat. The Biological Opinion on the Effects of Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls within the Willamette Province, FY 2017, proposed by the Mt. Hood National Forest; and Willamette National Forest; on the Northern Spotted Owl and its’ Designated Critical Habitat (FWS Reference Number 01EOFW00-2017-F-0045 and 17-14) was received in August 2017.

Summary of Effects

The habitat removal would not impact the ability of owls to utilize habitat at the stand scale since the trees that would be removed are spread out across a long narrow corridor rather than in one patch resulting in the function of the habitat within each stand to remain unchanged. Therefore the removal of roughly 3.7 acres of dispersal habitat **may affect but is not likely to adversely affect** spotted owls. Future nesting opportunities would be reduced by removing large trees and snags within suitable habitat and territories that are currently below threshold levels would have some habitat removed, therefore, the removal of approximately 5.1 acres is **likely to adversely affect** spotted owls. Because the tree removal is along a narrow corridor, the function of the habitat within these stands would remain unchanged.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.3 Region 6 Sensitive Species – Gray Wolf, Fringed Myotis, Western Bumblebee, Johnson’s Hairstreak

Gray Wolf

Existing Condition

Gray wolves (*Canis lupus*) were reintroduced in the mid-1990s in central Idaho and Yellowstone National Park and then dispersed naturally into Oregon. In 2008 the first wolf pack was confirmed in Oregon on the Umatilla National Forest by Oregon Department of Fish and Wildlife (ODFW) biologists. In May 2001, the FWS delisted wolves in Idaho, Montana, parts of Oregon, Washington, and Utah. In December

2015 the ODFW removed the gray wolf from its endangered species list because the wolf had met the state's population criteria for delisting. Wolves in Oregon west of Hwy 395 remain protected by the federal Endangered Species Act. The FWS is the lead management agency for wolves west of Hwy 395, including those that may be on the Forest.

In March 2015, a male wolf from the Imnaha Pack identified as OR25, moved through the Columbia Basin and southern Blue Mountains before traveling west and spending a number of weeks on the Mt. Hood National Forest. OR25 then traveled south to Klamath County and continues to remain in that area. Because wolves have the ability to disperse over large distances, as in the case of other wolves (OR7 and OR3) that have established territories in southern Oregon, there is the possibility that other undetected wolves have been or may currently be on the Forest. In January, 2018, two wolves were captured on remote sensing cameras in the southeastern portion of the Forest. The breeding status of those wolves is unknown. Since 2018, there have been multiple wolf sightings on the Mt. Hood National Forest.

Effects Analysis

Analysis Area

The analysis area for gray wolves includes the pipeline and a one mile buffer.

No Action Alternative

There would be no increase in human activities in the area and therefore there would be no effect to wolves.

Proposed Action Alternative

No dens or rendezvous sites have been detected on the Forest or within the project area. The possibility of a wolf den or rendezvous site remaining undetected in the vicinity of the project area is extremely unlikely because of the vocal nature of wolf packs and the amount of human activity that takes place on this part of the Forest. Project related activities would increase human presence during implementation and this may cause wolves to temporarily avoid the area. While the Proposed Action may cause wolves to temporarily avoid the area during project implementation, the Proposed Action is not within a mile of any den or rendezvous site and would not disrupt breeding behavior, therefore, the proposed project would have ***no effect*** to gray wolf.

Cumulative Effects

Because there is no effect to gray wolf from the Proposed Action, there are no cumulative effects.

Consistency Determination

The Following Mt. Hood National Forest Land and Resource Management Plan Standards and Guidelines that apply to the Proposed Action alternative and would be met:

- FW-174: Habitat for threatened, endangered, and sensitive species has been identified and managed in accordance with the ESA (1973), the Oregon ESA (1987), and FSM 2670.
- FW 177 & 178: Consultation with the USFWS shall occur on each program activity or project that the Forest Service determines may affect threatened or endangered species. Consultation shall be completed before any decision is made on the proposed project.

Consultation

- Because there is no effect to gray wolf from the Proposed Action, consultation is not required for this species.

Summary of Effects

There is no effect to the gray wolf because no dens or rendezvous sites have been detected on the Forest or within the project area.

Fringed Myotis

Existing Condition

The most common habitats in which the Fringed Myotis has been found are oak, pinyon, and juniper woodlands or ponderosa pine and Douglas-fir forest at middle elevations (O'Farrell and Studier 1980, Cockrum et al. 1996, Wilson and Ruff 1999, Ellison et al. 2004). This species is mostly found in dry habitats where open areas are interspersed with mature forests, creating complex mosaics with ample edges and abundant snags. Suitable roosting sites are an important habitat component, the availability of which can determine population sizes and distributions (Humphrey 1975, Kunz 1982). Abundance of large snags and low canopy cover allows more thermal heating of roosts, easier flight access to roosts, and the ability to readily switch roosts, for predator avoidance, or to find more suitable microclimates (Lewis 1995, Weller 2000). Some studies have suggested that fringed myotis consume mostly beetles (Rainey and Pierson 1996), but others in the Pacific Northwest have suggested mainly moths (Whitaker et al. 1977). Anecdotal information supports a diet largely of beetles and moths (Turner and Jones 1968, Arizona Game and Fish Department 1997). The loss of habitat through conversion and degradation is a major threat to this species. Second to loss of forested habitat is the loss of stand structural complexity, which supports both foraging and roosting activities. Disturbances of native vegetation can enhance the spread of invasive plant species, which may further disrupt insect diversity and densities. Other threats include recreational caving, rock climbing, commercial mining and quarrying of roost habitat. Pesticide use and environmental contaminants may reduce prey availability and bioaccumulate in bats. White-nose Syndrome (WNS) has recently arrived in the northwest. Given that many *Myotis* species have been severely impacted in the eastern United States, WNS could negatively affect fringed myotis as well. Threats to this species are enhanced by its patchy distribution and general low abundances.

Effects Analysis

No Action Alternative

Under the No Action alternative, fringed myotis roosting and foraging habitat would not be impacted. There are no hibernacula or mines in the analysis area. The No Action alternative would have approximately 125 more snags for roosting since this species roosts in snags larger than 11 inches DBH and none would be cut for the pipeline replacement.

Proposed Action Alternative

The Proposed Action would have no impact on maternity colonies or hibernacula since caves and mines are not in the project area. Some roost trees would be removed, including 125 snags larger than 11 inches DBH. Tree removal under the Proposed Action would benefit fringed myotis only slightly by opening the canopy along the pipeline which would improve foraging habitat. Large snags in the adjacent stands would continue to provide roosting habitat. Even though some roosting snags would be removed for pipeline construction, foraging habitat would be slightly improved and roosting habitat would still be provided adjacent to the pipeline, therefore the Proposed Action **may impact individuals or habitat, but**

will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable), and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

There are no known mines or caves that would provide for maternity colonies or hibernacula, therefore there are no cumulative effects to these structures. The Dalles Watershed Phase I and II would benefit the fringed myotis by increasing the potential for larger trees on the landscape and opening the canopy which provides foraging. Past timber harvest on federal land that targeted large ponderosa pine has reduced the number of large ponderosa pine which would become the large snags needed for roosting habitat.

Summary of Effects

Some roosting snags would be removed for pipeline construction, foraging habitat would be slightly improved and roosting habitat would still be provided adjacent to the pipeline, therefore the Proposed Action **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.**

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

Western Bumblebee

Existing Condition

Surveys for Western bumblebees were conducted by the Xerces Society on the Forest in 2013 and by Forest Service biologists in 2015. A total of 34 locations were surveyed in 2013 and Western bumble bees were located at 8 of these locations. In 2015, 24 locations were surveyed and bumble bees were detected at 8 locations, 6 of which were previously unreported locations for this species. In 2016, 23 locations were surveyed and Western bumblebees were documented at 6 of these sites. Five of the six sites were new locations for this species. One of the new locations found was in the meadow adjacent to Bear Springs Campground and previous detections were made adjacent to the project area at Little Crater Lake and Jackpot Meadow.

Effects Analysis

The analysis area for Western bumblebee includes the Dog River Pipeline Project boundary.

No Action Alternative

Under the No Action alternative, there would be no direct impacts to bumble bee nesting, foraging, and over-wintering habitat. There would be fewer flowering plants for foraging under this alternative in the long-term since canopies along the pipeline would remain unchanged and less sunlight would reach the forest floor which is required for the growth of most nectar plants.

Proposed Action Alternative

The proposed project may temporarily impact flowering plants during pipeline construction. Reducing this food source would reduce the ability of foraging bees to find nectar at these sites which is a required food source for young bees. It is expected that these shrubs would regenerate within a few years and that the bumblebees would have other nectar plants available adjacent to the proposed pipeline.

The proposed project may temporarily impact nest sites if these nests are located within abandoned bird nests or other structures above ground. Pipeline construction activities could reduce the number of nests available in the short-term and therefore reduce the number of bumblebees that this area could support. Nest sites would increase within a few years after construction. The temporary reduction in flowering shrubs and nesting sites **may impact individuals but will not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species**.

The total number of acres impacted would not exceed 10.3 acres since that is the total area of the footprint of the pipeline. While the number of bees in the analysis area may be slightly reduced, this reduction would be temporary as flowering shrubs and nest sites increase within a few years after treatments.

Because bumblebees can forage for nectar on a variety of flowering plants, the area adjacent to the pipeline would continue to provide a food source. These portions of the watershed would also continue to provide for nesting and hibernating habitat. The adjacent untreated areas would allow for bumblebees to recolonize the impacted acres within the treatment area as foraging and nesting habitat return. Between 2 and 10 years after treatments, there would be an increase in flowering plants for foraging compared to the No Action alternative since the area along the pipeline would be more open and more sunlight would reach the forest floor which is required for the growth of most nectar plants.

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable), road decommissioning and road closures, trail construction and maintenance, pre-commercial thinning, and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

Projects that may increase or improve foraging habitat in the long-term include road closures, and pre-commercial thinning. While weed treatments may benefit bumblebees by improving habitat for native flowering plants, bees can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides. Depending on the prescription and the condition of the stand before treatments, timber harvest may increase or decrease the amount of foraging habitat available. Trail construction and maintenance reduces the amount of foraging and nesting habitat.

Habitat alterations including those that could destroy, fragment, alter, degrade or reduce the food supply produced by flowers as well as destruction of nest sites and hibernation sites for overwintering queens, such as abandoned rodent burrows and bird nests, adversely affect these bees. Large scale ground disturbing activities alter landscapes and habitat required by bumble bees by removing flowering food sources, disturbing nest sites and altering the vegetation community. The size of bumble bee populations diminish and inbreeding becomes more common as habitats become fragmented. This in turn, decreases the genetic diversity and increases the risk of population decline.

While the projects analyzed under cumulative effects may have impacts to individual bumble bees, the main threats to this species are agriculture and urban development, livestock grazing, and broad scale insecticide application (Thorp et al. 2008). These kinds of activities are not included in the Proposed Action. Because some of the proposed activities increase or improve habitat while others may decrease it, the impacts would likely be beneficial and detrimental at the same time, and populations of this species would still persist in the analysis area.

Consistency Determination

The Proposed Action alternative is consistent with the following Standards and Guidelines for sensitive species: (1) FW-174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670; and, (2) FW-175: habitat for threatened, endangered and sensitive plants and animals shall be protected or improved.

Summary of Effects

The temporary reduction in flowering shrubs and nesting sites may impact individuals, but will not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

Johnson's Hairstreak

Existing Condition

Johnson's hairstreak occurs within coniferous forests which contain the mistletoes of the genus *Arceuthobium*, commonly referred to as dwarf mistletoe. These plants are highly specialized and are known to occur on a number of different conifers (Schmitt and Spiegel 2008). Larsen et al. (1995) states that old-growth and late successional second growth forests provide the best habitat for this butterfly, although younger forests where dwarf mistletoe is present also supports *C. johnsoni* populations. All sightings in both Washington and Oregon have been in coniferous forests. Ecoregions where this species occurs in Oregon, as determined by the Oregon Biodiversity Information Center include the Ochoco, Blue and Wallowa Mountains, Coast Range, East Cascades, Klamath Mountains, West Cascades and the Willamette Valley. Larvae can be found feeding on dwarf mistletoe (Opler and Wright 1999). Caterpillars feed on all exposed plant parts and secrete a sugary solution which is used by ants that in turn protect the caterpillar from predators. Caterpillars can be found on host leaves April-October (Allen et al. 2005). Nectar of flowers in several families from numerous genera including *Actostophylos, Ceanothus, Cornus,* dandelion, *Fragaria, Rorippa* and *Spraguea* is consumed by adult butterflies who obtain additional moisture by visiting mud puddles (Shields 1965). Due to their habitat associations and tendency to reside in the forest canopy, these butterflies are not often encountered. The main threats to this species are the reduction of old-growth, insecticide use, and application of herbicides to flowering plants that are nectar sources.

Effects Analysis

Analysis Area

The analysis area for Johnson's hair streak includes the Dog River Pipeline project boundary.

No Action Alternative

Under the No Action alternative, there would be no direct impacts to Johnson's hair streak larval and foraging habitat. There would be fewer flowering plants for foraging under this alternative in the long-term since canopies would remain closed and less sunlight would reach the forest floor which is required for the growth of most nectar plants.

Proposed Action Alternative

The Proposed Action could impact the larval stage of Johnson's hairstreak by removing large trees with mistletoe. Mistletoe brooms may also be removed where it is a ladder fuel component. Trees with mistletoe would not be directly targeted by this project and would continue to be present throughout the planning area. Mature forest structure would also remain within treated and adjacent untreated stands.

The proposed project may temporarily impact flowering plants during road maintenance, road construction, fuels treatments, and timber harvest activities. Reducing this food source would reduce the ability of foraging butterflies to find nectar at these sites which. It is expected that these flowers and shrubs would regenerate within a few years and that the butterflies would have other nectar plants available within the project area.

While the number of Johnson's hairstreak in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs increase within a few years after treatments. Because these butterflies can forage for nectar on a variety of flowering plants, the untreated portions of the planning area would continue to provide a food source. These untreated portions of the planning area and many of the treated stands would continue to provide mistletoe for caterpillar habitat. The Proposed Action **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.**

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable), pre-commercial thinning, road decommissioning and road closures, trail construction and maintenance, The Dalles Fuels Treatments Phase I and II, The Dalles Watershed Fuel Reduction, were considered in this cumulative effects analysis because the activities overlap in time and space.

Projects that may increase or improve foraging habitat in the long-term include plantation thinning, road closures, pre-commercial thinning, and noxious weed treatments. While weed treatments may benefit butterflies by improving habitat for native flowering plants, butterflies can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides.

Depending on the prescription and the condition of the stand before treatments, timber harvest may increase or decrease the amount of foraging habitat available. Trail maintenance removes flowing plants but at the same time maintains edges that promote the growth of flowering plants and shrubs.

Consistency Determination

The Proposed Action alternative is consistent with the following Standards and Guidelines for sensitive species: (1) FW-174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670; and, (2) FW-175: habitat for threatened, endangered and sensitive plants and animals shall be protected or improved.

Summary of Effects

The Proposed Action **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** While the number of Johnson's hairstreak in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs increase within a few years after treatments. These butterflies can forage for nectar on a variety of flowering plants, the untreated portions of the planning area would continue to provide a food source.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.4 Management Indicator Species – Deer, Elk, Pileated Woodpecker, American Marten, Wild Turkey, Western Gray Squirrel

Deer and Elk

Existing Condition

The project area supports elk and deer for most of the year. Elk cows and calves are in the western portion of the watershed from early spring though late fall. Black-tailed deer are common and relatively abundant in the spring, summer, and fall within the western portion of the planning area. The eastern portion of the planning area is identified in the Mt. Hood LRMP as inventoried winter range, most of which is in B10 Land Use Allocation. A number of deer and elk spend the winter there depending on snow accumulation. Deer are less likely to be there during periods of heavy snowfall as they are less able to move through deep snow. Forage is available in the planning area, but is generally of low quality due to the lack of un-forested areas. With the reduction in regeneration timber harvest, the Forest now has abundant optimal and thermal cover, but openings for forage are becoming scarce. There are approximately 69,226 acres of early-seral habitat on the Forest. This level is declining over time at mid and lower elevations since plantations have grown dense with trees that shade out forage. There are few dry meadows in the planning area, and forage habitat improvement for elk is limited.

High road densities lead to harassment of elk herds. Harassed elk move more often than elk left alone and use of habitat decreases as road density increases (Witmer 1985). It is also recognized that elk within or moving through areas of high open-road densities move longer distances; often several miles per day.

Effects Analysis

Analysis Area

The analysis area for deer and elk is the East Fork Hood River Watershed.

No Action Alternative

Disturbance from human presence and activities within the planning area would remain the same as the current levels.

Proposed Action Alternative

Pipeline construction activities could potentially disturb and temporarily displace animals in the area at the time of implementation. Project activities would not all be occurring at the same time, but in a few places at any one time. The potential disturbance is predicted to be small in scale, temporary in nature and only impact a few individuals. There would be no increase in the long-term harassment of deer and elk and the project is not expected to cause a measurable reduction or increase in the current local population size for either deer or elk.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), road decommissioning and road closures, pre-commercial thinning, The Dalles Watershed Phase I and II Fuel Reduction, and The Dalles Watershed Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

Cover is not considered a limiting factor for deer and elk in the analysis area because much of the Forest's lands are providing cover and very little forage opportunities. The optimum cover forage ratio is 60 percent forage and 40 percent cover (Thomas, 1979). Forage availability is more of a limiting factor on the Forest, but is more available off-Forest as a result of regeneration harvest on private lands. Cumulatively, there would be a small increase in forage and a small decrease in cover which would move the forage to cover ratio towards the optimum ratio.

An increase in human presence from developed and dispersed campsites would modify behaviors and may cause some avoidance behaviors by both deer and elk. Deer are expected to be more tolerant of recreation, while elk are less, and may move out of areas at certain times of the year. However, seasonal closures on roads and trails are implemented in the areas for winter range, and for reasons of trail stability. Trails would impact deer and elk but are not anticipated to impact populations.

Consistency Determination

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to “maintain viable populations of existing native and desired non-native vertebrate species in the planning area.” The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species in this BE would be maintained at the Forest-scale.

Open road densities under the Proposed Action would be reduced. However, the Forest Plan Standard of 2.5 miles per square mile of open roads for inventoried summer range (FW-208) would not be met. The Forest Plan Standard for open road densities within B10 and inventoried winter range would continue meeting the Forest Plan Standard of 1.5 (B10) and 2.0 (inventoried winter range) miles per square mile.

Summary of Effects

An increase in human presence from developed and dispersed campsites would modify behaviors and may cause some avoidance behaviors by both deer and elk. However, seasonal closures on roads and trails are implemented in the areas for winter range, and for reasons of trail stability. Trails would impact deer and elk but are not anticipated to impact populations.

Pileated Woodpecker

Existing Condition

The pileated woodpecker was chosen as a management indicator species because of its need for large snags, large amounts of down woody material, and large defective trees for nesting, roosting and foraging. Large snags and decadent trees are important habitat components for pileated woodpeckers (Hartwig et al. 2004, Mellen et al. 1992). The association with late seral stages comes from the need for large-diameter snags or living trees with decay for nest and roost sites, large-diameter trees and logs for foraging on ants and other arthropods, and a dense canopy to provide cover from predators. Because ants are the main diet for pileated woodpeckers, large diameter snags and logs with some decay are selected for foraging because carpenter ants inhabit these sites. Given the amount of habitat available, there may be up to 10 home ranges in the project area when considering unmanaged stands as habitat.

Effects Analysis

Analysis Area

The analysis area for the pileated woodpecker includes the area within the project boundary. The Northwest Forest Plan directs the B5 pileated woodpecker/American marten areas to return to their underlying land allocation in Matrix lands except where needed to assure habitat and dispersal for the guilds of species represented by the pileated woodpecker and marten. The Forest assessed the relative importance of individual B5 areas in contributing to late seral forest conditions at the watershed landscape level. Based on that assessment, the Forest recommended that certain B5 areas be returned to the underlying land allocation and that individual watershed analysis take a closer look at the remaining B5 areas. There is no B5 in the Analysis Area.

No Action Alternative

There would be no short-term effects to pileated woodpecker habitat under this alternative. In the short-term, large trees and snag levels would remain essentially unchanged. In 20 to 30 years, more snags are likely to be added along the pipeline.

Proposed Action Alternative

Pipeline construction would impact habitat by removing large trees and snags which would reduce the amount of nesting and foraging trees available for up to one pair of pileated woodpeckers. This impact would be long-term since trees would not be allowed to grow back along the pipeline.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space. Past timber harvest on federal lands has reduced the amount of habitat in the analysis area. Habitat for this species has continued to increase over time across the Forest but the analysis area would likely provide less habitat than other areas of the Forest due to past and present timber harvest.

Consistency Determination

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area." The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species in this BE would be maintained at the Forest-scale.

Summary of Effects

Pipeline construction would impact habitat by removing large trees and snags which would reduce the amount of nesting and foraging trees available for up to one pair of pileated woodpeckers. This impact would be long-term since trees would not be allowed to grow back along the pipeline.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

American Marten

Existing Condition

In the western United States, the American marten's distribution is fragmented. Home ranges vary from 1 to 4.5 square miles for males and from 0.4 to 3.6 square miles for females (Simon 1980, Zielinski et al. 1997). Martens prey on vertebrates smaller and larger than themselves, eat carrion, and forage for bird eggs, insects, and fruits (Martin 1994). American martens are closely associated with forested habitats with complex physical structure near the ground. Use of non-forested habitats by martens increases in summer and includes meadows and small harvest units near forest edges, as well as areas above the tree line in western mountains (Buskirk and Ruggiero 1994). Activities such as timber harvest and road construction that fragment, dissect, and isolate habitats are the largest threats to marten. Fragmented habitats attract habitat generalist predators like the great-horned owl, coyote, and bobcat which can all prey on marten. In addition, fragmentation eliminates the connectivity and creates isolated individuals and populations which are more susceptible to extirpation.

Effects Analysis

Analysis Area

The analysis area for the American martin includes the area within the project boundary. The Northwest Forest Plan directs the B5 pileated woodpecker/American marten areas to return to their underlying land allocation in Matrix lands except where needed to assure habitat and dispersal for the guilds of species represented by the pileated woodpecker and marten. The Forest assessed the relative importance of individual B5 areas in contributing to late seral forest conditions at the watershed landscape level. Based on that assessment, the Forest recommended that certain B5 areas be returned to the underlying land allocation and that individual watershed analysis take a closer look at the remaining B5 areas. There is no B5 in the Analysis Area.

No Action Alternative

There would be no short-term effects to American marten under this alternative. In the short-term, habitat and snag levels would remain essentially unchanged. In 20 to 30 years, more snags are likely to be added along the pipeline.

Proposed Action Alternative

Pipeline construction would impact marten habitat by removing large trees and snags which would reduce the amount of denning and foraging trees available. This impact would be long-term since trees would not be allowed to grow back along the pipeline.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

Past timber harvest on federal lands has reduced the amount of habitat in the analysis area. Habitat for this species has continued to increase over time across the Forest but the analysis area would likely provide less habitat than other areas of the Forest due to past and present timber harvest.

Consistency Determination

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to “maintain viable populations of existing native and desired non-native vertebrate species in the planning area.” The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species in this BE would be maintained at the Forest-scale.

The Forest wide Standards and Guidelines would be met for B5 American marten land allocation. At least 160 acres of mature and/or old growth forest habitat shall be maintained within each 320 acre Management Area for American marten (B5-010). Snags are discussed below under “Snag and Down Log Associated Species.”

Summary of Effects

Pipeline construction would impact marten habitat by removing large trees and snags which would reduce the amount of denning and foraging trees available. This impact would be long-term since trees would not be allowed to grow back along the pipeline.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

Wild Turkey and Gray Squirrel

Existing Condition

Wild Turkey

The wild turkey is a management indicator species for the ponderosa pine-Oregon white oak vegetation association of the Forest. Two subspecies of wild turkeys (Merriam's and Rio Grande) are found on the Forest. Turkeys feed on acorns, conifer seed, insects, and grass/forbs and nest on the ground hidden by grass or shrubs. Turkeys roost on the ground and in large diameter (> 14 inch dbh) ponderosa pine and Douglas-fir generally on slopes greater than 30 percent and within 0.5 miles of a food source.

Western Gray Squirrel

The western gray squirrel is also a management indicator species for the ponderosa pine-Oregon white oak association of the Forest. Western gray squirrels need a mix of mast-producing trees to provide food, cover, and nesting sites in their habitat. The ecological range of the western gray squirrel includes a variety of habitat types within mixed conifer and oak forests. High tree species diversity is a common component of western gray squirrel habitat and contributes to habitat quality (Linders, 2000). Gray squirrel have been documented in the planning area and there is both wintering and nesting habitat.

Effects Analysis

Analysis Area

The analysis area for wild turkey and Western gray squirrels includes the area that lies within the project boundary.

No Action Alternative

Under the No Action alternative, there would be no change to forage and hiding cover for wild turkey. Western gray squirrel would continue to have an abundance of nesting habitat and mycorrhizal fungi for foraging.

Proposed Action Alternative

The Proposed Action would have little impact to wild turkey since the pipeline construction would minimally open stands and provide some suitable foraging, nesting, brood-rearing, and roosting cover. Pipeline construction would open the forest canopy in places and provide a combination of open, mature, mast-producing forests and shrubs, and species of varying ages and sizes that would create a mix of habitats. Because the pipeline is so narrow, this increase would be minimal. The stands adjacent to the pipeline would maintain patches of forested habitat that would serve as travel corridors.

The Proposed Action would have both negative and beneficial impacts to western gray squirrels. Reduction of canopy cover and disturbance of the litter layer during construction may reduce soil moisture resulting in lower mychorrhizal fungi production, which is an important food source for this species. Western gray squirrels would continue to forage in the stands adjacent to the pipeline and would also nest in adjacent conifer stands with higher canopy cover. The Proposed Action would not be expected to reduce the number of Western gray squirrels that the planning area could support because tree removal for the pipeline adjacent to uncut stands would continue to provide conditions suitable for both foraging and nesting.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space. These projects would have a combination of beneficial and negative impacts to wild turkey and western gray squirrel. Timber harvest and thinning have reduced the canopy cover which reduces nesting habitat for western gray squirrel but may also increase pine seed production for foraging.

Consistency Determination

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area." The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species in this BE would be maintained at the Forest-scale.

Summary of Effects

The Proposed Action would have little impact to wild turkey since the pipeline construction would minimally open stands and provide some suitable foraging, nesting, brood-rearing, and roosting cover. The Proposed Action would not be expected to reduce the number of Western gray squirrels that the planning area could support because tree removal for the pipeline adjacent to uncut stands would continue to provide conditions suitable for both foraging and nesting.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.5 Snag and Down Log Associated Species

Existing Condition

Snags

Currently, 63.3 percent of the East Fork Hood River Watershed contains no large snags in eastside mixed conifer compared to the historic condition of 34.6 percent. The only category where current levels exceed historical conditions is in 0-2 large snags per acre. Currently, 16.7 percent of the watershed has between 0 and 2 snags per acre and historically that number was 14.2. This Watershed is deficient in high concentrations of snags with 8.1 percent of the area with 10 or more snags per acre historically and 3.9 percent currently.

Down Wood

While current and reference conditions of large down logs in eastside mixed conifer are comparable, there are some differences. Historically, 14.0 percent of the White River Watershed had 2 to 4 percent cover of large down logs compared to 6.8 percent currently. Under historic conditions, none of the watershed had greater than 12 percent cover and currently 6.9 percent of the watershed has greater than 12 percent cover.

Effects Analysis

The analysis area includes the White River Watershed. The Pipeline falls within the habitat type identified in DecAID as Eastside Mixed Conifer with vegetation condition types of small/medium trees and large trees.

No Action Alternative

In the short-term, portions of the pipeline that go through plantations would provide low amounts of down wood cover. Most areas would be below 6.5 percent cover of down wood and therefore be below the 30 percent tolerance level for wildlife habitat. However, some of the pipeline would likely have at least 3 percent of down wood comprised of classes 1 thru 4 and therefore would meet the 30 percent tolerance level for natural down wood conditions, as indicated by DecAID inventory data from unharvested plots.

In the next 20 to 30 years, these stands would begin to experience increased stand density and start to become increasingly more susceptible to damaging agents such as insects and diseases. These natural processes would recruit new snags and down logs, mainly from the smaller intermediate and suppressed trees.

Proposed Action Alternative

The proposed action would involve the removal of trees and dead wood within a 25-foot corridor. Approximately 438 live trees ranging in size from 6" to 48" dbh that will be removed. Of these 438 trees, roughly 12 are larger than 24" dbh, 170 are between 12" and 14" inches, and the remaining trees are 11" and smaller. In addition to the live trees approximately 198 standing dead trees would be cut. Of these, over half are between 11" and 20" inches, roughly 3 are over 30" dbh, 22 between 20" to 30", with the remainder under 11" dbh. Some of the live trees proposed for cutting would have eventually become snags and down wood. The total acre of trees and snags proposed for cutting is 10.3 acres. The Watershed is 102,016 acres and the proposed acres removed represents 0.01. Assuming that 20 percent of the live trees would eventually become snags in the next 50 years, the potential amount of snags lost from the proposed pipeline would not exceed 0.005 percent of the Watershed which is not measurable at a meaningful scale and the comparison of reference and current conditions for down logs and snags would remain unchanged. The project design criteria that requires 5 percent of the largest trees to be left on site, increasing the amount of large down wood in the planning area.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), road decommissioning and road closures, and trail maintenance and relocation were considered in this cumulative effects analysis because the activities overlap in time and space.

It is not likely that private lands would provide snags and downed wood in the foreseeable future. Other timber harvest activities on Forest Service land would improve structural diversity by initiating a new age class and by creating openings. Thinning would also have an indirect impact by releasing the green retention trees. These retention trees would later become the large diameter snags and downed wood. Blocks of unharvested habitat would provide large snags and down wood while the treated areas of the watershed move toward the mature forest state. The adjacent untreated areas would allow for snag and down wood-dependent species to recolonize habitat as snags and down wood increase in the treated areas.

Consistency Determination

FW-219 and FW-223 indicate that stands should have 6 logs per acre in decomposition class 1, 2, and 3 and that they should be at least 20 inches in diameter and greater than 20 feet in length. However, FW-225 and FW-226 indicate that smaller size logs may be retained if the stand is too young to have 20 inch trees. Under the Proposed Action, logs representing the largest tree diameter class would be retained, maintaining compliance.

Summary of Effects

The proposed acres removed represents 0.01 percent of the East Fork Hood River Watershed which is 102,016 acres. Assuming that 20 percent of the live trees would eventually become snags in the next 50 years, the potential amount of snags lost from the proposed pipeline would not exceed 0.005 percent of the Watershed which is not measurable at a meaningful scale.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.6 Neotropical Migratory Birds

Existing Condition

Close to 30 species of migratory birds occur on the Barlow and Hood River Districts, some of which are present within the project area during the breeding season. Some species favor habitat with late-successional characteristics, such as the hermit thrush and brown creeper, while others favor early-successional habitat such as the Nashville warbler or the Williamson's sapsucker. Other species like the white headed woodpecker and pygmy nuthatch utilize open ponderosa pine habitat. Sandhill crane nest in Camas Prairie in the open meadow when it is flooded in the spring and early summer.

Effects Analysis

The analysis area for migratory birds includes areas within the boundary of the Proposed Action.

No Action Alternative

There would be no habitat alteration under this alternative. Stand conditions and the composition of migratory bird species dependent on these stands would remain unchanged.

Proposed Action Alternative

Research has demonstrated that timber removal enhances habitat for a number of migratory species and provides habitat for some species that are rare or absent in un-thinned stands (Hagar and Friesen 2009). However, some species of migratory birds have been shown to decline following thinning. The effects of tree removal would most likely have a combination of positive, neutral, and negative impacts on migratory bird use depending on which species are present. The species that may benefit from tree removal in the analysis area include the olive-sided flycatcher, Williamson's sapsucker, and chipping sparrow. The species that may be negatively impacted by tree removal include the brown creeper, Swainson's thrush, and hermit warbler. Because the trees to be removed are in a linear pattern along the pipeline, the effects to migratory bird species would be difficult to measure since the habitat at the stand scale would remain unchanged.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), road decommissioning and road closures, The Dalles Watershed Phase I and II Fuel Reduction, and The Dalles Watershed fuel reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

Open habitat that would be created could be beneficial for early seral species like the olive-sided flycatcher, white-headed woodpecker and Williamson's sapsucker. The Swainson's thrush and brown creeper would be negatively impacted by habitat removal. The cumulative effects of timber harvest activities are similar to the effects of the Proposed Action and would have a combination of positive, neutral, and negative impacts on migratory birds.

Consistency Determination

The Proposed Action is consistent with Executive Order 13186 (66 Fed. Reg. 3853, January 17, 2001) "Responsibilities of Federal Agencies to Protect Migratory Birds." This Executive Order directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. This Executive Order also requires federal agencies to develop Memorandum of Understandings (MOU) with the FWS to conserve birds including taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible. The Bureau of Land Management and U.S. Forest Service have both completed, and are currently implementing, their respective MOU's with the FWS.

Summary of Effects

The effects of tree removal would most likely have a combination of positive, neutral, and negative impacts on migratory bird use depending on which species are present. Because the trees to be removed are in a linear pattern along the pipeline, the effects to migratory bird species would be difficult to measure since the habitat at the stand scale would remain unchanged.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.7 Botany

3.7.1 Existing Condition

This project is located in an area which has been managed in the past. Some large legacy trees remain, but it is predominantly second-growth Douglas-fir, with a shrub component of oceanspray (*Holodiscus discolor)* and wild rose (*Rosa gymnocarpa)* among others. There is a healthy diversity of understory forbs and grasses within this area, especially within forest openings. The trees and shrubs have been thinned along the road systems to maintain a fuel break, and now support a dense grass and forb community. Along the pipeline itself there are several small, wetland habitats. These have been determined to be naturally created sites (see the Fisheries report for more information) which could provide potential habitat for certain bryophyte species. Only one species was known from within this project area, and no new sites were found during project surveys.

Shistostega pennata

The goblin-moss, *Shistostega pennata*, is listed as a Class A species on the 2001 ROD. It used to be on the Regional Forester's Sensitive species list, but has been removed and does not have a state ranking with the Oregon Natural Heritage Program. There is one historic site for the goblin-moss within Brook's Meadow creek near the project area. There is one point along this creek where the pipeline and access will cross. Surveys at this site did not find any specimens. The goblin-moss is an ephemeral species which often colonizes mineral soil, most often within the root mass of recently downed trees. These sites are most common in moist areas, or sites such as caves or riparian areas which stay moist. As this bare, mineral soil becomes colonized by other bryophytes and plants after the first year, the goblin-moss will fade out (Harpel and Helliwell 2005).

3.7.2 Effects Analysis

No Action Alternative

Under the No Action alternative, no activities involving the pipe replacement, and all associated ground-disturbance, repair and maintenance would occur. There would be no impact to sensitive vascular plants, bryophytes, lichens and fungi.

Proposed Action Alternative

The Proposed Action includes ground-disturbing activities associated with removing the old, existing pipe and replacing it and other infrastructure. There is also planned, regular maintenance along this pipeline. This work will remove existing vegetation and create early seral habitats along the pipeline.

There are no current sites for sensitive vascular plants, bryophytes, lichens and fungi within this project area, so there will be no impact to any of these species.

Cumulative Effects

There are no sensitive species known from this area, resulting in no cumulative effects to consider within this report.

3.7.3 Consistency Determination

Forest Service Policy

The No Action alternative and the Proposed Action alternative are consistent with the following Forest Service Standards FSM 2672.1 - Sensitive Species Management and FSM 2670.22(2) - "Maintain viable populations of all native and desired non-native wildlife, fish and plant species in habitats distributed throughout their geographic range on National Forest System lands."

Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) Direction

The No Action alternative and the Proposed Action alternative are consistent with the following Forestwide Standards; FW-148, 149 and 150, FW-162, FW-174, FW-175 – "Habitat for threatened, endangered, and sensitive plants and animals shall be protected and/or improved, and FW-176.

2001 Survey and Manage Record of Decision

The No Action alternative and the Proposed Action alternative are consistent with the survey protocols 2001 Survey and Manage Record of Decision. All botany surveys included consideration of botanical species in Table C-3 of the 2001 Survey and Manage Record of Decision.

National Forest Management Act (NFMA) Implementing Regulations

The No Action alternative and the Proposed Action alternative are consistent with regulations 36 CFR 219.19 and The 1983 USDA Departmental Regulation 9500-4.

3.7.4 Summary of Effects

The Proposed Action would have no impact on sensitive vascular plants, bryophytes, lichens and fungi because there are no sensitive vascular plants, bryophytes, lichens and fungi within this project area.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.8 Invasive Plant Species

3.8.1 Existing Condition

The project area is located within a previously managed area. The area has a healthy growth of native shrubs, grasses and forbs which prevents the establishment of invasive species. The 1700 road is maintained as a fuel break, and is also heavily utilized for travel and recreation. This route has been used many times in the past several years as a haul route for timber sales. Because of these activities, this road and nearby landings or trailheads have been regularly surveyed and managed for invasive weeds for many years. The 1700-014 road runs parallel to the existing pipeline, and is used primarily for pipeline maintenance and not for regular travel. The target invasive species, or "noxious weeds" identified by the Oregon Department of Agriculture (ODA) that are known to occur within or adjacent to the project area are spotted and diffuse knapweed, bull thistle and St. Johnswort. There are only sparse populations of each within the project area.

3.8.2 Effects Analysis

No Action Alternative

The No Action alternative would have no effects which would increase or introduce invasive weed populations. None of the planned activities would take place, and no ground disturbance would occur. Vectors which are currently present would continue to have the potential for invasive species introduction and spread.

Proposed Action Alternative

The Proposed Action would remove old pipeline, replace it and other infrastructure, and would provide maintenance along this new line. These ground-disturbing activities would create favorable conditions for invasive species establishment from new or current populations and seed source. As part of the project, pipes and gravel/sand materials will be stockpiled at four different sites off the 1700 road and 4400-011 road. These stockpiles will be in open, previously disturbed areas which have been approved for use. Introduction of new weed species or infestations can occur through this material and its use during the project implementation. Machinery also has the potential to bring in new weed seeds or particles, or transport it from neighboring infestations.

Project Design Criteria associated with the Proposed Action would provide mitigation for the introduction of new weed species, and would prevent the spread of current invasive species into areas without infestation as well as to other areas of the forest. This prevention would occur through the cleaning of equipment, use of weed-free materials, and restoration with native seed. Machinery would be washed prior to its arrival on forest land. There are only small infestations near the project area, but those haul routes, landings and known sites within the project area would be treated prior to implementation.

The level of risk for the introduction or spread of noxious weeds is moderate and based on the following: known weeds in/and or adjacent (~ 100 feet) to the project area, in moderate quantities (Moderate density/acre), no more than four of vectors 1 - 8 present in the immediate project area, project operation activities not able to avoid weed populations.

Long term treatments are not proposed as part of this project, and would be conducted under a separate program and NEPA document (FEIS Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River National Scenic Area in Oregon including Forest Plan Amendment #16.

Cumulative Effects

The area analyzed for cumulative effects was within the Dog River 6th field subwatershed, with a focus on the travel ways within and associated with the project. Of the projects and activities found in Table 1, road decommissioning and road closures, The Dalles Watershed Phase I and II Fuel Reduction, The Dalles Watershed fuel reduction, trail maintenance and relocation, were considered in this cumulative effects analysis because the activities overlap in time and space.

These projects overlap in space and some overlap in time. The use of the 1700 road system and nearby trails for project haul routes and travel has a continued risk for invasive species introduction. Project Design Criteria, as discussed above, would mitigate for the introduction and spread of invasive species. Under the 2008 Site-Specific Invasive Plant Treatment EIS, roadside populations would be treated regularly depending on the need and level of infestation. These combined actions would lower the risk of invasive species introduction within the project area. This additional road maintenance would be addressed separately through the FEIS Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River National Scenic Area in Oregon including Forest Plan Amendment #16.

3.8.3 Consistency Determination

Forest Service Manual (FSM) 2900 Invasive Species Management direction requires the determination of "the risk of invasive species introduction or spread as part of the project planning and analysis process for proposed actions, especially for ground disturbing and site altering activities, and public use activities" (FSM 2904.08, #8)

FSM 2900 also states, "Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas" (FSM 2903).

The identification of management and prevention is also consistent with the Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon FEIS/ROD (2008).

Northwest Forest Plan Direction:

- FW-299 - "Noxious weed control projects shall comply with Region Six "Managing Competing and Unwanted Vegetation" FEIS, Record of Decision (1988), and Mediated Agreement (1989)."

- FW-300 - "Plants that have been identified as pests by the State Department of Agriculture shall be controlled as described in the Mt. Hood National Forest Noxious Weed Implementation Plan."

- FW-301 - "Implementation of control measures should adhere to the following priorities:
  - Prevention
  - Early treatment
  - Maintenance
  - Correction
  - No action (per Vegetation Management FEIS, Record of Decision 1988, and Mediated Agreement 1989)"
  - B2-056 – "Vegetation management adjacent to major travel routes or recreation sites shall be consistent with the Northwest Region (R6) "Management of Competing and Unwanted Vegetation" FEIS, Record of Decision (1988) and Mediated Agreement (1989)"

3.8.4 Summary of Effects

The Proposed Action would have a moderate risk of weed introduction. The pipe removal and replacement activities would create disturbed conditions for invasive species growth, and the equipment may introduce seeds or propagules from nearby roadside sources. Mitigations are proposed to reduce the risk of invasive species introduction and spread.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.9 Recreation

3.9.1 Existing Condition

Recreational activities occur within and adjacent to the project area. The area is popular for dispersed recreation, including hunting and camping. A popular non-motorized trail system is located along The Dog River Pipeline as well as in the adjacent area. The following existing conditions within the planning area will be examined: the Recreation Opportunity Spectrum, dispersed recreation, and trails.

Recreation Opportunity Spectrum (ROS)

The majority of the proposed project falls within the ROS setting identified in the Forest Plan as: Roaded Modified. Recreation experiences and opportunities in these areas often depend on vehicular access off the primary routes via secondary roads. Camping experiences are relatively primitive, with few on-site facilities provided, requiring some self-reliance and use of primitive outdoor skills.

A small portion of the project falls within the Roaded Natural ROS setting. This portion of the project is not a high use recreation area. Roaded National ROS settings provide for areas characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. These evidences usually harmonize with the natural environment. Interaction between users may be low to moderate but with evidence of other users prevalent. Resource modification practices are evident but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and the design of facilities.

Dispersed Recreation

Dispersed recreation use may occur throughout the project area. Dispersed recreation in the vicinity of the proposed pipeline replacement may include camping, hunting, berry picking, mushroom picking, and driving for pleasure. Other incidental recreational use may occur as well.

Trails

There are numerous popular trails along FSRs 44 and 17. Surveyors Ridge Trail 688 is popular for hikers, horseback riders and mountain bikers. The trail winds through forested areas, open areas and along Surveyors Ridge where it provides views of Mt. Hood and the surrounding valley. The trail is located on top of the Dog River Pipeline for approximately 2.7 miles. This section of the trail is also an access road, but portions of it have grown in significantly over the years making it look more like a trail than a road.

Surveyors Ridge Trail 688 connects with other popular trails in the area which provide large loops for nonmotorized recreationists to connect. Surveyors Ridge connects directly to The Super Connector, Dog River Trail 675 and Cooks Meadows Trail 639. Many mountain bikers enjoy riding several trails in one day, and Surveyors Ridge is often a popular choice for both locals and visitors who have heard about the views the trail offers.

FSRs 44 and 17 are snowmobile trails during the winter. The roads are closed November 15 through March 15 and may be groomed for snowmobiles December 1 through April 1. A local snowmobile club performs the grooming under a road use permit with the Mt. Hood National Forest.

Table 65. Trails within Project Area.

Trail Name and Number	Permitted Use	Approximate Length (Miles)
Surveyors Ridge 688	Pack and Saddle, Bike, Hike	13.0
Dog River 675	Bike, Hike	5.3
Cooks Meadow 639	Pack and Saddle, Bike, Hike	3.0

3.9.2 Effects Analysis

No Action Alternative

There would be no direct or indirect effects from the No Action alternative. Taking the No Action alternative would have no impact to the ROS spectrum, dispersed recreation, or trails.

Proposed Action Alternative

Recreation Opportunity Spectrum (ROS)

The pipeline replacement would not have a detrimental impact on the Roaded Modified ROS or Roaded Natural ROS. In both ROS settings motorized use is evident. Project completion could bring more routine maintenance utilizing vehicles along the pipeline right-of-way. This activity would be consistent with these ROS settings, as well as the presence of a modern, roaded right-of-way.

Dispersed Recreation

The proposed project could have some impacts to dispersed recreation. During project implementation, forest visitors could see and hear construction along the pipeline right-of-way and the proposed staging areas. This impact would be temporary and only occur during project implementation.

Another effect would be the presence of a modern right-of-way with the completion of the project. The new right-of-way would look different from the existing right-of-way and have substantially less vegetation shading it. Some visitors may enjoy the new right-of-way, and use it for non-motorized recreation. Others may miss the old right-of-way which was not visible from the roadway and was well shaded and had vegetation encroaching upon in in areas.

Visitors who enjoy driving for pleasure would see the right-of-way corridor where it crosses FSR 17. The right-of-way would be the most visible from the west side of the road. Some visitors may not appreciate the change in scenery from the road, although it will impact the view for less than 100 linear feet along the road.

Trails

Sections of the Surveyors Ridge Trail 688 would be closed during implementation. A 2.7 mile section of the trail overlaps with the existing right-of-way. This section of trail would be substantially different once the pipeline is replaced as the right-of-way which is currently covered with native surface and shaded by vegetation would be disturbed to replace the existing pipeline and resurfaced with aggregate and widened to 25 feet. To mitigate this impact, a trail has been constructed connecting the Super Connector trail directly to Surveyors Ridge Trail 688. This action will allow visitors to use the Super Connector Trail to directly access the Surveyors Ridge Trail and bypass the section of trail where the pipeline replacement would take place. A reroute was also completed to allow visitors to stay on a primitive trail and avoid the sections of existing trail where it would be impacted by the pipeline project, except at one intersection.

Some visitors might prefer using the pipeline right-of-way once it becomes a modern right-of-way. They might enjoy easy access along the corridor. Others may be disappointed that what they perceived to be a trail and not a right-of-way looks and feels more like a road. There would likely be a period during construction when there wouldn’t be trail access to the unimpacted section of Surveyors Ridge trail from the Dog River and Cooks Meadow Trails. Some visitors may not utilize the trail system for this reason. However, this would be temporary. All changes to the system would be posted at pertinent trail heads, on pertinent websites and released to the public ahead of time, so visitors could plan accordingly.

It is unlikely that the Dog River Pipeline replacement would have an impact on groomed snowmobile trails in the vicinity of the project.

Cumulative Effects

Of the projects and activities found in Table 1, the items below were considered when analyzing cumulative effects for recreation. These items were analyzed as a result of their proximity to the planning area and their potential to have an effect on recreation within the planning area. The spatial context of the cumulative effects analysis lies within one mile of any portion of the proposed pipeline replacement. Under the Proposed Action, these items could have an impact on the planning area. Combined with the Proposed Action, these actions would not deviate from Forest Plan standards.

Trail Maintenance

No cumulative effects would occur. The affected portion of Surveyors Ridge Trail would be closed and the portion of the trail overlapping the pipeline right-of-way would be permanently impacted, but project design criteria would mitigate any long term impacts after the project was complete by rerouting the trail to provide a similar, somewhat primitive trail experience. Over time, potential hazard tree removal along trails could open up scenic views near the project area. This could improve views of Mount Hood as well as other unique natural features within the planning area.

Hazardous Fuels Reduction

No cumulative effects would occur. The projects would occur in close proximity, and trail closures would occur due to each project. However, they would not be likely to be implemented at the same time. Furthermore, the Surveyors Ridge Trail reroute would help mitigate impacts of closure of the Dog River Trail which would occur during the implementation of the fuels reduction.

Road decommissioning and road closures

No cumulative effects would occur. Road closures within and adjacent to the project could eliminate access to dispersed campsites and other dispersed recreation use like berry picking. There are already a minimal number of roads in the vicinity. Any closures would be minimal and would have a small impact on access for dispersed recreation. Over time, potential hazard tree removal along roads could open up scenic views near the project area. This could improve views of Mount Hood as well as other unique natural features within the planning area.

3.9.3 Consistency Determination

Table 66 lists the Standards and Guidelines from the Forest Plan pertinent to the No Action alternative and the Proposed Action alternative.

Table 66. Consistency with Forest Plan Standards and Guidelines.

Standards & Guidelines	Relevant Element of Proposed Action	Does the Proposed Action Meet Standard as currently designed?	Data Used for Analysis
FW-451/458: Forest Management activities with the potential to adversely impact trails and associated facilities and dispersed recreation sites shall include measures to minimize impacts and provide for protection and/or restoration of the impacted trails, sites, facilities, and structures.	Installation of a modern pipeline and modern right-of-way in the same location as the Surveyors Ridge trail.	Yes	Surveyors Ridge Trail Reroute Decision Memo.
FW-460: Trail systems shall be designed, located, managed, and maintained to consider user's needs and other resource objectives	Installation of a modern pipeline and modern right-of-way in the same location as the Surveyors Ridge trail.	Yes	Surveyors Ridge Trail Reroute Decision Memo.
FW-452/463: Designated trails, trailheads, associated facilities, and dispersed recreation sites impacted and/or adversely affected by management activities, shall be rehabilitated, restored, and/or relocated.	Installation of a modern pipeline and modern right-of-way in the same location as the Surveyors Ridge trail, and closure of portions of the trail system.	Yes	Surveyors Ridge Trail Reroute Decision Memo.
B2-001: Structures and improvements may be provided to protect resource values, for administrative purposes, and to accommodate recreational use	Pipeline installation is needed for administrative purposes for The City Of The Dalles	Yes	Proposed Action discusses need for improving the existing pipeline.
B2-005: A trail system should be developed and designated to disperse recreational use and provide a range of difficulty levels.	Pipeline will have an impact on trail system. Separate decision mitigates	Yes	Surveyors Ridge Trail Reroute Decision Memo.

Standards & Guidelines	Relevant Element of Proposed Action	Does the Proposed Action Meet Standard as currently designed?	Data Used for Analysis
	impacts to trail system.		
B6-003,004,005: The development of new or expansion of existing recreation sites, facilities and trails may occur, but should avoid or protect sensitive watershed lands. These sites, facilities and trails shall not be permitted in The Dalles Watershed.	Pipeline will have an impact on trail system. Separate decision mitigates impacts to trail system.	Yes	Surveyors Ridge Trail Reroute Decision Memo.
C1-001: Dispersed recreation opportunities shall be provided and encouraged. Hiking and trail use, driving for pleasure, hunting, wildlife viewing, berry picking, cross-country skiing, the use of off-road vehicles, and cultural resource interpretation are examples of possible activities.	Installation of a modern pipeline and modern right-of-way in the same location as the Surveyors Ridge trail.	Yes	Surveyors Ridge Trail Reroute Decision Memo.

3.9.4 Summary of Effects

Recreation Opportunity Spectrum (ROS)

There would be no direct effects to the two ROS settings identified within the planning area under the No Action alternative or the Proposed Action alternative. Regardless of the course of action, the ROS settings would remain the same, and recreational opportunities within the settings would remain the same.

Dispersed Recreation

There would be no direct or indirect effects to dispersed recreation under the No Action alternative. Under the Proposed Action alternative there may be some impacts to dispersed recreation during project implementation if visitors are unable to access areas they would like to visit. Construction sights and sounds could also have a negative impact on someone’s experience in the vicinity of the project if they are seeking solitude and quiet, however, this would be temporary. The new modern right-of-way could be perceived either positively or negatively by visitors depending on visitor perspective.

Trails

The Proposed Action alternative would impact the trail system in the vicinity of the project. Surveyors Ridge trail would be the most directly impacted as a 2.7 mile section of the trail overlaps with the right-of-way. This segment of trail would be permanently modified by the project. A reroute of the trail will mitigate concerns related to the change in the condition of the trail itself by continuing to provide a semiprimitive trail experience and continuing to connect Surveyors Ridge trail to the other trails along the FSR 44 corridor.

A segment of trail bypassing the construction will be constructed prior to implementation of the pipeline replacement, which would provide continuity for the majority of the trail system. The full reroute would not be completed until the entire pipeline replacement was completed, so there would be an impact in the short term. In the long term, the system would remain intact.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.10 Cultural Resources

3.10.1 Existing Condition

Very few archaeological surveys or excavations have been conducted in the area, and little is known about the prehistory of the area. Nearby peeled cedar trees suggest that huckleberries and other plant resources were probably gathered, along with hunting forays for deer, elk and other wildlife. Expansive vistas of Mt. Hood were probably enjoyed for recreational and spiritual pursuits; a few rock cairns and rock features have been located overlooking the East Fork Hood River and the mountain. Some of the current hiking trails and roads likely follow earlier Indian trails, especially the 4410 and 4420 roads, and possibly the 1700 and 1720 roads.

Although there are no known Traditional Cultural Properties known to exist near the project area, stacked rock features and lithic scatters within a few hundred meters of the project location indicate a varied and intensive use of the area. A projectile point recovered from the 4420 site (661NA0184) appears similar to the Eastgate type and suggests that the area was utilized at least 2500 years ago (Perino 1985).

Dog River Aqueduct

The Dog River Aqueduct is considered individually eligible for inclusion on the National Register of Historic Places. The Dog River Aqueduct (661EA0031) is largely intact as it was constructed in 1913-1914, with the exception of at least two areas repaired with steel pipe or terra cotta pipe. The feature also exhibits a high degree of engineering skills, with all of the labor conducted using hand tools. Features associated with the aqueduct include a total of eight rocked pressure valves, seven rocked culverts, the log stringer bridge crossing over Meadow Creek, scattered clay tiles, gauging stations, and a concrete access box. A portion of the pipeline was replaced with steel pipe during a previous failure in 1944. Today, pipeline maintenance consists of driving wooden wedges beneath the steel bands to tighten the seams and replacing deteriorated segments.

Dog River Head Works Log Cabin

The Dog River Head Works Log Cabin (661EA0073) is considered eligible for inclusion on the National Register of Historic Places as contributing elements to the historic district. It was constructed in 1904, is believed to be the oldest structure at the head works. The cabin has played a key role in the development and installation of the aqueduct. The cabin has experienced some modifications, is leaning into a hillslope, and is partially deteriorated, but is still largely intact.

Dog River Head Works Cabin and Wood Shed

The Head Works Cabin is considered eligible for inclusion on the National Register of Historic Places as contributing elements to the historic district. The cabin portion of the Dog River Head Works Cabin and Wood Shed (661EA0074) was constructed in 1922 in the Mill Creek area and later moved to the head works. The structure has always functioned as the headquarters for the head works, and appears to be unmodified. According to Keyser, the cabin was constructed in 1922 on City of The Dalles property on Lower Mill Creek, and later moved (no date) to its current location. The cabin has always served as patrol and maintenance headquarters for City Water Works staff.

The Wood Shed component of the Dog River Head Works Cabin and Wood Shed (661EA0074) was constructed in the 1940s by Tobe Payne, and moved to its current location in 1969 (Unpublished manuscript; William Keyser August 27, 1980). The Wood Shed lies outside of the Period of Significance for the Dog River Head Works.

Dog River Diversion Cabin

The Dog River Diversion Cabin (661EA0075) is considered individually eligible for inclusion on the National Register of Historic Places. It was constructed between 1910 and 1920 (exact date unknown) during the installation of the pipeline. The structure is unique because of the “US” stamping exhibited on the ends of each log; this stamping shows early cooperation between the City of The Dalles and the US Forest Service in the management of the watershed.

Brooks Meadow Pipeline

The site was initially documented in 1990 by Kirk Metzger as part of the Dog River Aqueduct, FS number 666EA0031. For the purpose of this analysis the Brookes Meadow Pipeline is documented as FS number 666EA0298, separate from the Dog River Pipeline. The site consists of a water transmission pipeline.

The Dog River Telephone Line

The Dog River Telephone line (661EA0350) consists of 12 trees with the remains of a telephone line along both sides FSR 4400-011. The telephone line remains consist of brown and white split-tree ceramic insulators or wire mountings. The trees are immediately adjacent to the road. The insulators are mounted on the trees at various heights. A 1916 Oregon National Forest Map shows a telephone system running north from a guard station at Brooks Meadow, which may have connected to the Dog River Telephone Line. The telephone line was probably installed to monitor conditions at the head gate works for the Dog River Aqueduct (Pipeline) and was most likely installed when the Dog River Head Works Cabin (661EA0074) was placed at the head works in 1922.

The Dalles Water Supply Ditch

The water Supply Ditch (661EA0351) is considered individually eligible for inclusion on the National Register of Historic Places. The intact portions of the ditch are a good example of early efforts by local communities to begin to manipulate and manage resources on Federal lands determined to be vital for their survival. The site is a linear feature that extends north from the bank of Dog River for approximately 2.18 miles. The ditch measures up to 16 feet wide and up to 5 feet in depth. The ditch begins on the east bank of Dog River about 3,143 feet upstream from the dam and diversion at the current headworks for the Dog River Aqueduct. No diversion remains at the point where the ditch leaves Dog River.

The Dog River Diversion and Impoundments

The Dog River Diversion and Impoundments is considered eligible for inclusion on the National Register of Historic Places as contributing elements to the historic district. This site is comprised of two small dams on the Dog River; an upper dam and a lower dam. The upper dam consists of concreate and is located approximately 78 feet upstream from the lower dam. There are two modern gauging stations at the site. The lower dam is located at the Head Gate Cabin, and consists of a complex structure designed to impound and divert waters from Dog River into the Dog River Aqueduct. There is a spillway at the east end of the dam. The aqueduct intake is beneath the Dog River Diversion Cabin (661EA0075), and consists of a ‘pond’ partially enclosed by concrete walls. There is a covered grate in front of the intake. Modern metal steps and railings lead up the north face of the dam, where a walkway constructed of boards leads to a metal sluice gate.

The Dog River Diversion and Impoundments (661EA0364) has been significantly modified through the years. The modifications include the addition of concrete abutments, the addition of walkways, the modification of the intake, the addition of modern steps, the addition of a sluice gate, and the addition of modern hand rails. The appearance of the dam has changed dramatically from the same structure photographed in 1923. The feature does not retain suitable integrity to be considered individually eligible for inclusion in the National Register of Historic Places; however, the feature can be considered as a contributing element to the Dog River Head Works historic district.

3.10.2 Effects Analysis

No Action Alternative

By not replacing the pipeline, Heritage Resources would continue to persist in their existing condition. The resources would be affected by decay, natural forces, and continued maintenance to the pipeline and associated infrastructure.

Proposed Action Alternative

To determine the effects of the Proposed Action, it is necessary to assess the significance, or eligibility for inclusion in the National Register of Historic Places, for each of the historic properties potentially affected by the Proposed Action.

Dog River Aqueduct

It is expected that although the historic pipeline would be left intact, most if not all of the associated features would most likely be obliterated during the installation of the new pipeline. The setting of the pipeline would be affected by the removal of trees and equipment maneuvering. However, the effects on the setting would only be temporary as the exposed slopes would be stabilized and it is expected that conifer trees would quickly restock in a natural process. Although the proposal calls for leaving the historic pipeline intact and functioning through the replacement process, the old pipeline will no longer carry water once the new pipeline is operational. Without constant exposure to water, it is expected that the historic pipeline will rapidly deteriorate. The Dog River Aqueduct is a buried artifact; replacing the pipe would have no impact on the visual character or historic nature of the pipeline; however, the visual setting would be disrupted temporarily. Interpretive opportunities would not be affected by the replacement of the buried pipeline. The Dog River Aqueduct has been fully documented. An interpretive sign explaining the history of the aqueduct would be erected along the Surveyors Ridge Trail. The Proposed Action would have **no adverse effect** on the Dog River Aqueduct. The project will have **no adverse effect** on the Dog River Head Works historic district.

Dog River Head Works Log Cabin

The proposed replacement of the Dog River Aqueduct would occur about 30 feet to the west of and adjacent to the cabin. Equipment maneuvering would occur along Forest Service Road 4400-011 adjacent to the cabin. The cabin would not be directly affected by the proposed project. However, the setting of the cabin would be affected by the removal of some of the vegetation between the road and the pipeline. However, the effects on the setting would only be temporary as the exposed slopes would be stabilized and it is expected that conifer trees would quickly restock in a natural process. There would be no indirect effects to the cabin. The proposed project would have **no adverse effect** to the Dog River Head Works

Log Cabin (661EA0073). The project will have **no adverse effect** on the Dog River Head Works historic district.

Dog River Head Works Cabin and Wood Shed

The proposed replacement of the Dog River Aqueduct would occur about 30 feet to the west of the cabin, where the pipeline is situated beneath Forest Service Road 4400-011. The setting includes a small graveled parking area to the south of the cabin. There would be no direct or indirect effects to the cabin or the wood shed. The proposed project would have **no effect** to the Dog River Head Works Cabin and Wood Shed (661EA0074). The project will have **no adverse effect** on the Dog River Head Works historic district.

Dog River Diversion Cabin

The replacement of the Dog River Aqueduct would involve modifications to the intake, situated beneath the cabin. The intake has been modified and no longer retains any historic character. The cabin would remain in its current location; there are no plans to modify, move, or change the cabin. There would be no direct or indirect effects to the cabin. The proposed project would have **no effect** to the Dog River Diversion Cabin (661EA0075). The project will have **no adverse effect** on the Dog River Head Works historic district.

Brooks Meadow Pipeline

The replacement of the Dog River Aqueduct would involve use of Forest Service Road 1700-014 adjacent to and above the southern portion of the Brooks Meadow Pipeline. The southern portion of the Brooks Meadow Pipeline lies near the 25-foot wide maintenance/access corridor required for the pipeline replacement and would likely be impacted by the project. The northern portion of the pipeline above the crossing of Forest Service Road 1700-014 over Meadow Creek would remain unaffected by the project. It has been determined that the pipeline does not contribute to the NRHP eligibility of the Dog River Head Works historic district, and is not individually eligible for inclusion on the NRHP. There would be no indirect effects to the pipeline. The Brooks Meadow Pipeline is considered to be ineligible for inclusion in the NRHP, both as an individual resource and as a contributing element to the Dog River Head Works historic district. The proposed project would have **no effect** to the Brooks Meadow Pipeline (661EA0293) or to the historic district.

Dog River Telephone Line

The Dog River Telephone Line lies adjacent to Forest Service Road 4400-011 and within the 25-foot wide corridor for equipment maneuvering. The telephone line would likely be impacted by the project; many of the trees containing insulators are dead or dying, and would be removed as hazard trees. Other trees containing insulators may be obstacles to equipment maneuvering and would be removed. There would be no indirect effects to the telephone line. The Dog River Telephone Line is considered to be ineligible for inclusion in the NRHP, both as an individual resource and as a contributing element to the Dog River Head Works historic district. The proposed project would have **no effect** to the Dog River Telephone Line (661EA0350) or to the historic district.

The Dalles Water Supply Ditch

The ditch lies outside of any of the proposed areas affected by the project. The Dalles Water Supply Ditch would not be directly or indirectly affected by the project. There would be **no effect** to the Dalles Water Supply Ditch (661EA0351).

Dog River Diversion and Impoundments

A fish screen is scheduled to be installed as part of the project. The structure would measure about 40 feet long and 20 feet wide. The structure would connect to the existing dam and extend upstream for 40 feet, and extend into the stream 20 feet from the diversion intake gate. The fish screen would be added to the main diversion as described above. The addition of the fish screen would be a permanent attachment and visual change to the impoundment. There would be no indirect effects to the Dog River Diversion and Impoundments (661EA0364). The proposed project would have **no adverse effect** to the Dog River Diversion and Impoundments (661EA0364). The project will have **no adverse effect** on the Dog River Head Works historic district.

Cumulative Effects

For heritage resources, any effects are limited to site specific locations. Any cumulative effects would also be limited to heritage resources situated within proposed areas of ground disturbance. It has been determined that the project as proposed would have no adverse effect on heritage resources. All projects shown in Table 1, were considered for cumulative effects; however, none of the proposed projects involve heritage resources situated within the proposed project areas. There are no known projects that would overlap with the current project area in the foreseeable future, therefore there would be no cumulative effects for heritage resources as a result of implementing any of the action alternatives. The consultation for the Heritage Resource Survey results and recommendations for the project have been completed in accordance with the 2004 PA and submitted to the Oregon SHPO for review; the results of the SHPO review are pending.

3.10.3 Consistency Determination

The project would not adversely impact any significant heritage resources. Based on the proposed protective measures, the project meets the criteria in the Programmatic Agreement for “No Historic Properties Adversely Affected” determination.

This action is consistent with Forest Plan goals to protect important heritage resources. Heritage resource inventories were conducted in compliance with the 2004 PA during the project planning stage (FW-598, FW-600, FW-610, FW-602 and FW-606), the field survey results were fully documented (FS-608). Heritage resources potentially affected by the project activities have been evaluated for inclusion on the NRHP (FW-612), and the potential effects to heritage resources from the proposed projects have been assessed (FW-609, FW-610). All records and documents concerning heritage resources for the project are kept on file at the Hood River Ranger District, Mt. Hood National Forest (FW-626).

3.10.4 Summary of Effects

Under the Proposed Action, the City of The Dalles proposes to replace the entire length of the Dog River Aqueduct and add a fish screen to the lower impoundment at the intake. Pipe, gravel, and equipment would be staged at as many as three storage areas. A complete (100%) survey of the entire project area revealed a collection of features and structures comprise the Dog River Head Works historic district, shown in Table 67.

Table 67. Dog River Head Works Historic District

Forest Service Temporary Number	Name	Description
661EA0031	Dog River Aqueduct	Historic wood pipeline
661EA0073	Dog River Head Works Log Cabin	Historic cabin
661EA0074	Dog River Head Works Cabin and Woodshed	Historic structures
661EA0075	Dog River Diversion Cabin	Historic Cabin
661EA0293	Brooks Meadow Pipeline	Historic wood/steel pipeline
661EA0350	Dog River Telephone Line	Historic telephone line
661EA0351	The Dalles Water Supply Ditch	Historic Ditch
661EA0364	Dog River Diversion and Impoundments	Historic dams, intake

The historic district was determined to be eligible for inclusion on the National Register of Historic Places (NRHP) based on NRHP Criterion A with a Period of Significance of 1887 to 1922. Properties determined to be individually significant and eligible for inclusion on the NRHP include the Dog River Aqueduct (661EA0031), the Dog River Diversion Cabin (661EA0075), and The Dalles Water Supply Ditch (661EA0351). Properties determined to be eligible for inclusion in the NRHP as contributing elements to the historic district include the Dog River Head Works Log Cabin (661EA0073), the cabin portion of the Dog River Head Works Cabin and Wood Shed (661EA0074), and the Dog River Diversion and Impoundments (661EA0364). Properties determined to be ineligible for inclusion on the NRHP and also non-contributing elements of the historic district include the Brooks Meadow Pipeline (661EA0293) and the Dog River Telephone Line (661EA0350). No protective measures are required or recommended for ineligible properties.

For each of the properties documented during the survey, it was determined that the project would have the effects listed in Table 68.

Table 68. Summary of Effects, Dog River Head Works

Temporary Number	Site Name	Eligibility	Determination of Effect	Description of Effects
661EA0031	Dog River Aqueduct	Individually Significant	No Adverse Effect	Property is below ground, no visual effects to historic character. Property has been fully documented. An interpretive sign will be installed. Most of associated features expected to be obliterated. Property is part of municipal water source with upgrades, maintenance expected. Upgrade required to avoid detrimental potential effects of failure. An interpretive sign explaining the aqueduct history would be installed. Setting affected by 25-foot wide installation corridor would be temporary; vegetation expected to restock naturally.

Temporary Number	Site Name	Eligibility	Determination of Effect	Description of Effects
661EA0073	Dog River Head Works Log Cabin	Contributing element - moved from original location	No Adverse Effect	Setting of cabin affected by 25-foot wide installation corridor would be temporary; vegetation expected to restock naturally.
661EA0074	Dog River Head Works Cabin and Wood Shed	Cabin is contributing element- moved from original location. Wood Shed is outside of Period of Significance	No Effect	Setting is already open and would remain unchanged. Cabin would not be impacted by pipeline replacement
661EA0075	Dog River Diversion Cabin	Individually Significant	No Effect	Intake would be modified, but cabin would be left unmodified and intact.
661EA0293	Brooks Meadow Pipeline	Non-eligible	No Effect	Property determined to be ineligible
661EA0350	Dog River Telephone Line	Non-eligible	No Effect	Property determined to be ineligible
661EA0351	The Dalles Water Supply Ditch	Individually Significant	No Effect	The property lies outside of any activity areas associated with this project.
661EA0364	Dog River Diversion and Impoundments	Contributing element-has been significantly modified	No Adverse Effect	The lower dam has already been significantly modified. The addition of a fish screen would be consistent in scope and scale with previous modifications. No historic materials would be removed.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.11 Climate Change

3.11.1 Existing Condition

The Council on Environmental Quality has identified that climate change is a particularly complex challenge given its global nature and the inherent interrelationships among its sources, causation, mechanisms of action, and impacts. Projects and programs with a Federal nexus requiring the disclosure of environmental impacts under NEPA have the potential to either affect the amount of greenhouse gases (GHGs) in the atmosphere or to be affected by climate change.

There has been growing concern and interest over the effects of climate change on National Forests and their current status as a carbon sink. Evidence suggesting that the correlation between an increase in average global temperatures and the extent of forest lands impacted annually is compelling. The size, frequency and duration of drought, wildfire, and insect/disease outbreaks has been trending to increase over the last several decades. It is believed that the role of these events has had a notable effect on the carbon cycle in the forested ecosystems across the Nation.

This project involves the replacement of an aging water conveyance pipeline with a new one. It was not specifically intended to mitigate or respond to potential climate change. The project is not considered to be an action that would be categorized as a primary contributor to local, regional, or global greenhouse gas emissions. Forested land will not be converted into a developed or agricultural condition. The extent of tree removal would be limited to the construction corridor and minimized to that which is only necessary for the replacement of the existing pipeline. Since the project's footprint of disturbance would be comparatively very small in the regional or global context, this analysis will not attempt to quantify carbon emission or sequestration. This section will address however, aspects of the project that may affect carbon emission or sequestration at the local scale.

Tree removal, along with forest health and growth issues are discussed in Section 3.1, Vegetation Resources.

3.11.2 Effects Analysis

It is anticipated that for either alternative, the City of The Dalles would participate in climate change adaptation strategies being developed by the State, including those that would be executed by the OWRD and the Oregon Health Authority (OHA) for municipal and drinking water suppliers. The Oregon Climate Change Adaptation Framework (Kershner 2010), and the Oregon Climate Assessment Reports prepared by the Oregon Climate Change Institute (OCCI), have identified future water supplies and availability as a priority for focused development of adaptation strategies.

They have recognized implications of expected risks and adaptive capacity, to ascertain priorities and the need for potential near-term actions and long-range preparedness. Core to forecasted changes and water management adaptation is timing of response, authority for implementation, intergovernmental coordination, and community empowerment.

As with all municipalities, if warranted the City could be invoked in the future to implement a mandated response by State authority, which might alter their municipal water management and operations. Such actions would be expected to occur irrespective of pipeline replacement or provisions of their special use permit with the Mt. Hood National Forest. As with current regulation, any planning or future actions that would address or respond to climate change adaptation and the management of municipal water supplies would be regulated by the State. The development of an Integrated Water Resources Strategy is already well underway by the OWRD.

As a requirement of State regulation, the City already has in place a Water Management Conservation Plan (CTD 2014). In it are measures for increasing water use efficiency, reducing waste, and response strategies to shortages. The plan would be in effect with, or without a new pipeline.

No Action Alternative

As no vegetative manipulation would occur and pipeline construction would take place, the current carbon sequestration rates locally would remain unchanged and no additional carbon would be released into the atmosphere. The No Action alternative would not result in carbon emissions from vehicles or burning and would result in the retention of relatively slow growing trees. The mortality that results would be retained on site (see Sections 3.1, Vegetation Resources and 3.6, Wildlife for more details).

Proposed Action Alternative

This project is not likely to have direct localized effects on climate. By its very nature, the discussion of a project's effect on climate change is indirect and cumulative because the effects occur at a different time and place, and because the scale of the discussion is global. Since it is not reasonable to measure a project's global impact, the discussion here focuses on key elements of forest management discussed in the scientific literature.

For this proposal, the following actions have the potential to affect carbon emissions or sequestration:

- Fossil fuel would be used by equipment such as saws, tractors, skyline yarders and log trucks. It would be possible for some of this equipment to use biofuels if available and priced competitively.
- Some of the slash and debris resulting from clearing adjacent to the construction corridor would be burned on site or utilized locally for restoration projects. Slash and debris burning would release carbon into the atmosphere, while utilization of some of the debris would retain it for sequestration.

Cumulative Effects

The Proposed Action would result in some carbon emissions and some carbon sequestration. Effects of pipeline construction would be localized and of short-duration. Its effect cumulatively would be considered minute by comparison to regional scale carbon exchanges. See Section 3.1, Vegetation Resources, for a discussion of forest health and resiliency.

3.12 Congressionally Designated Areas

Congressionally designated areas include Wilderness, Wild and Scenic Rivers, and Inventoried Roadless Areas. None exist in the project area.

A portion of the East Fork of Hood River was added to the National Wild and Scenic Rivers System by the Omnibus Public Land Management Act of 2009 (Public Law 111-11). This portion is west of the project area. The Outstandingly Remarkable Values (ORVs) for the East Fork Hood River Wild and Scenic River segment include wildlife, recreation, and botany. As the ORVs exist outside any proposed treatment areas there would be no adverse effect to the ORVs for which the river segment was added to the National Wild and Scenic River System.

3.13 Environmental Justice and Civil Rights

On February 11, 1994, President Clinton issued the Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898). This order directs agencies to identify and address disproportionately high and adverse human health or environmental effects of projects on certain populations. In accordance with this order, the proposed activities have been reviewed to determine if they would result in disproportionately high and adverse human and environmental effects on minorities and low-income populations.

The communities of Mt. Hood/Parkdale, Odell and Hood River are less than 20 miles of the planning area. The communities of Dufur and The Dalles are less than 20 miles to the east / northeast of the planning area. Other communities that may have an interest in the proposal would include Sandy, Gresham and Portland to the West.

No disproportionate impacts to consumers, civil rights, minority groups, and women are expected from this project. Commercial thinning work would be implemented by contracts with private businesses. Project contracting for the project's activities would use approved management direction to protect the rights of these private companies.

The Dog River Pipeline Replacement planning area is located on usual and accustomed land for the Confederated Tribes of Warm Springs (as is all of the Mt. Hood National Forest). The Treaty of 1855 granted the Confederated Tribes of the Warm Springs (CTWS) the right of "usual and accustomed" gathering of traditional native plants and "special interest" use. According to the Ethnographic Study of the Mt. Hood National Forest (French et al. 1995), no traditional use areas have been identified in this planning area. No activities are proposed that would preclude any granted rights.

Because this project does not propose to increase, or reduce the amount or type of activities that occur on the forest, the proposal to implement this project is not expected to have any negative effect on special forest product gatherers.

3.14 Other Required Disclosures

3.14.1 Conflicts with Plans, Policies or Other Jurisdictions

This project would not conflict with any plans or policies of other jurisdictions. This project would not conflict with any other policies, regulations, or laws, including the Clean Water Act (see Section 3.3), Endangered Species Act (see Sections 3.4, 3.6, and 3.7), National Historic Preservation Act (see Section 3.13) and Clean Air Act (see Section 3.15). Other potential conflicts with plans, policies, or other jurisdictions are discussed below.

3.14.2 Floodplains and Wetlands

There are no jurisdictional floodplains or wetlands within the project area as per Executive Order 11988. There would be very limited impacts to non-jurisdictional floodplains or wetlands from this project. Due to the steepness of the topography, small stream size and confined nature of streams in this area, floodplain width is fairly limited. More detailed information on wetlands and floodplains are discussed in Section 3.3 (Hydrology), and 3.4 (Fisheries). Due to the PDCs and BMPs which are aimed at minimizing the impacts to wetlands and floodplains, there would be minimal direct and indirect effects. The proposed Action would be consistent with Section 404 of the Clean Water Act (CWA).

3.14.3 Air Quality

The proposed action associated with the Dog River Pipeline replacement has the potential to affect air quality: burning slash, exhaust generated by vehicles, equipment, chainsaws and helicopters and dust created by vehicles that drive on aggregate surface and native surface roads.

Summary - The following sections show that the proposed action complies with direction in the Forest Plan (as amended) and that activity fuels would be managed appropriately to minimize fire hazard while also minimizing effects to resources. The timing and quantity of smoke created by pile burning and broadcast burning would be managed to minimize air quality impacts.

3.14.3.1 Existing Conditions

Fine particulates less than PM2.5 (2.5 micrometers in diameter) cause reductions in visibility due to absorption and scattering of light by suspended particles. Almost all smoke particles from wildfire and prescribed fire, residential wood stoves and fireplaces, industrial boilers, field burning, diesel combustion, and other combustion processes can be characterized as fine particulates, primarily PM2.5 (ODEQ 2014). These small particulates can be inhaled and cause respiratory problems, especially in smoke sensitive portions of the population, such as the young, elderly, or those predisposed to respiratory ailments. Particles can accumulate in the respiratory system and aggravate health problem such as asthma.

Oregon Department of Environmental Quality classifies Class I Areas as “certain wilderness areas designated by Congress as federal Class I Areas that are subject to visibility protection under the Environmental Protection Agency’s Regional Haze Rule and the federal Clean Air Act”(ODEQ 2014).

The closest communities to the project area are the City of The Dalles, Parkdale, Odell, and the City of Dufur. Winds in this area can blow in different directions potentially affecting these communities.

3.14.3.2 Direct, Indirect and Cumulative Effects

The burning of slash piles would typically be implemented during fall when favorable smoke dispersal conditions are expected. Pile burning prescribed fires are primarily conducted when the ground is frozen or saturated, reducing the potential of smoldering and creeping into adjacent fuels. Prescribed burning would occur when the weather conditions would minimize visibility effects to Class I airsheds.

Cumulatively, this project uses similar techniques and timing as other projects in the Mt. Hood National Forest. While it is not known what year treatments would occur in or when piles would be available for burning, prescribed burning of various projects would occur spread over several years and at appropriate times of the year which would result in less air quality impact compared to wildfire. Air quality throughout Oregon can be affected by wildfire. Projects that reduce the likely size or intensity of wildfire have the effect of reducing overall air quality impact.

Cumulative effects of the proposed action when added to other fuel reduction projects and the impacts of wildfire and of fire suppression tactics would not be substantial.

3.14.3.3 Forest Plan Standards and Guidelines

The project is consistent with FW-039 to 053 because smoke would be minimized.

The Oregon Smoke Management Plan, which is administered by the Oregon State Forester, regulates the amount of forestry related burning that can be done at any one time. The amount of burning that can occur on any one day depends upon the specific type of burning, the tons of fuel loading to be ignited, and the atmospheric conditions available to promote particulate matter mixing and transportation of smoke away from sensitive areas. Through compliance and cooperation in the implementation of the Oregon Smoke Management Plan, the Proposed Action would comply with the following laws and regulations.

- The Federal Clean Air Act (CAA) is the primary legal basis for air quality regulations across the country.
- Oregon Smoke Management Plan, OS477.013, as administered by Oregon Department of Forestry
- Oregon State Implementation Plan (The Federal Clean Air Act Implementation Plan)

- Oregon Administrative Rules OAR 629-0048-0001: Smoke Management Rules
- Oregon Visibility Protection Plan for Class I Areas, OAR 340-200-0040, section 5.2
- Forest Service Best Smoke Management Practices 2012
- Forest Service Manual 2500-Watershed and Air Management, Chapter 2580-Air Resource Management - The project would minimize the impacts on air quality through compliance and cooperation with Federal, state and local air regulations to prevent significant adverse effects of air pollutants, mitigation of adverse impacts form prescribed fire on air resources though the application of Best Smoke Management Practices, and protection of air quality related values within Class I areas.

3.14.4 Treaty Resources and Reserved Indian Rights

No impacts on American Indian social, economic, or subsistence rights are anticipated. No impacts are anticipated related to the American Indian Religious Freedom Act. The Confederated Tribes of Warm Springs was contacted in reference to this Proposed Action.

3.14.5 Prime Farmlands, Rangelands, and Forestlands

None of the alternatives would have an adverse impact to the productivity of farmland, rangeland, or forestland because none were identified in the project area.

3.14.6 Potential or Unusual Expenditures of Energy

The No Action alternative would not require any expenditure of fuel or energy. The Proposed Action would require expenditures of fuel for workers to access the planning area, use power equipment, and to utilize the logging systems, and installation of the pipeline. Overall, the Proposed Action would not result in any unusual expenditure of fuel.

3.14.7 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that are forever lost and cannot be reversed. Irretrievable commitments of resources are considered to be those that are lost for a period of time and, in time, can be replaced. The use of rock for road surfacing and pipeline placement is an irreversible resource commitment.

3.14.8 Conflicts with Plans, Policies, or Other Jurisdictions

NEPA at 40 CRF 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with . . . other environmental review lands and executive orders.”

Based on information received during scoping, informal consultation meetings, and analysis in the EA, none of the alternative under consideration would conflict with the plans or policies of other jurisdictions, including the Confederated Tribes of Warm Springs. This project would not conflict with any other policies and regulations or laws, including the Clean Water Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, National Historic Preservation Act, and Clean Air Act.

Chapter 4 – Consultation and Coordination

The Forest Service consulted with federal, state, and local agencies and Tribes during the development of this assessment.

4.1 Federal, State and Local Agencies

- U.S. Fish and Wildlife Service
- NOAA National Marine Fisheries Service
- Oregon Historic Preservation Office
- Oregon Department of Fish and Wildlife
- Oregon Water Resources Department
- The City of the Dalles

4.2 Tribes

- Confederated Tribes of Warm Springs

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PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.

4. National Historic Preservation Act Section 106 Compliance, 2017 (Case No. 17-1079).

Oregon
Kate Brown, Governor

Parks and Recreation Department
State Historic Preservation Office
725 Summer St NE Ste C
Salem, OR 97301-1266
Phone (503) 986-0690
Fax (503) 986-0793
www.oregonheritage.org

July 21, 2017

Mr. Michael Dryden
USDA FS Hood River RD
6780 Hwy 35
Mt. Hood-Parkdale, OR 97041

RE: SHPO Case No. 17-1079
USFS Dog River Aqueduct Replacement Project 2017/060601/0002
Complete replacement of aqueduct
(1S 10E) 2S 10E), Hood River County

Dear Mr. Dryden:

We have reviewed the materials submitted on the USFS Dog River Aqueduct Replacement Project 2017/060601/0002 as referenced above and we concur with the determination that the Dog River Head Works Historic District is eligible for listing in the National Register of Historic Places. Additionally, we concur that the Dog River Aqueduct is individually eligible, the Dog River Head Works Log Cabin is contributing, the Dog River Head Works Cabin and Woodshed is contributing, the Dog River Diversion Cabin is individually eligible, and the Dog River Diversion and Impoundments are contributing to the overall eligibility of the district. We also concur with the finding of no adverse effect for the proposed project.

This letter refers to above-ground historic resources only. Comments pursuant to a review for archaeological resources will be sent separately.

Unless there are changes to the project, this concludes the requirement for consultation with our office under Section 106 of the National Historic Preservation Act (per 36 CFR Part 800) for above-ground historic resources. Local regulations, if any, still apply and review under local ordinances may be required. Please feel free to contact me if you have any questions, comments or need additional assistance.

Sincerely,

Jessica Gabriel
Historian
(503) 986-0677
Jessica.Gabriel@oregon.gov

Project Review for Heritage Resources under the Terms of the 2004 Programmatic Agreement among the USFS R6, ACHP, and SHPO
June 2004

Forest:	**Mount Hood National Forest**
Ranger District:	**Barlow Ranger District**
Counties:	**Hood River County**
Undertaking/Project Name	**Dog River Aqueduct Replacement Project** **Project 2017/060601/0002**
USGS Quads:	**Dog River, OR 1979**

By signing this document, the Forest Specialist certifies that for this project the Forest complies with Section 106 of the National Historic Preservation Act, under the terms of the 2004 Programmatic Agreement (PA) for the State of Oregon. This form shall be kept on file as supporting documentation

	Stipulation III (A) 1	Undertaking meets the criteria listed in Appendix A of the PA
	Date:	Inspection, monitoring, or other identification will be submitted to the Forest Specialist.
	Stipulation III(A)2	Undertaking meets the criteria listed in Appendix B of the PA.
	Date:	Inspection, monitoring, or other identification will be submitted to the Forest Specialist.
	Stipulation III(A)3	Undertaking meets the criteria listed in Appendix C (Exempt/Non-undertaking).
	Stipulation III (B)1	Undertaking meets the criteria in the PA for a No Historic Properties Affected determination.
	Stipulation III(B)2	Undertaking meets the criteria in the PA for a Historic Properties Avoided determination.
	Stipulation III(B)3	The Forest has notified interested Tribes and persons, as appropriate, of the findings and made the findings available to the public.
X	Stipulation III(B)4 Date: 06/20/2017	Historic Properties may be Adversely Affected. SHPO review period (30-day) required.
	Stipulation III(B)5 Date:	No Historic Properties Affected: The Forest Service provided documentation to the SHPO and notified all interested parties, and made the information available to the public. SHPO review period (30-days) required.

Michael D. Snyder	June 20, 2017
Forest Specialist	**Date**

For SHPO USE: For Historic Properties Adversely Affected, please indicate your opinion of our determination by marking the appropriate box below, sign and return this form to the Forest.

	I concur with No Historic Properties Adversely Affected	
	I do not concur, because in my opinion	
	Date Received	
	SHPO Bibliographic Number:	

5. **National Historic Preservation Act Section 106 Compliance, 2022 (Case No. Pending).**

PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.

6. **US Fish and Wildlife Service (USFWS) Endangered Species Act (ESA) Biological Opinion (#01EOFW00-2017-F-0045 and 17 14).**

Biological Opinion

on the Effects of

Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls

within the Willamette Province, FY 2017,

proposed by the

Mt. Hood National Forest; and Willamette National Forest;

on

the Northern Spotted Owl

and its' Designated Critical Habitat

(FWS Reference Number 01EOFW00-2017-F-0045 and 17-14)

Prepared by the Oregon Fish and Wildlife Office

U. S. Fish and Wildlife Service

Portland, Oregon

____

Paul Henson, Ph.D., State Supervisor

____

Date

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ACRONYMS

The following acronym list, as edited, is from the BA (FS 2016, pp. 245-247).

Acronym	Name
ACEC	Area of Critical Environmental Concern (BLM Land Use designation. Considered Administratively Withdrawn for the purposes of this BA)
AMA	Adaptive Management Area
BA	Biological Assessment
BLM	United States Department of Interior, Bureau of Land Management
BO	Biological Opinion
CA	Core Area (often a 0. 5 mile radius circle around a spotted owl activity center)
CH/CHU	Critical Habitat/Critical Habitat Unit
CSA	Conservation Support Areas (Recovery Plan)
dbh	Diameter Breast Height (measurement of tree diameter at approximately 4 feet from ground on the uphill side of the trunk)
DTR	Danger Tree Removal
EIS	Environmental Impact Statement
ERFO	Emergency Relief for Federally Owned [Roads]
ESA	Endangered Species Act
FS, USFS	United States Department of Agriculture, Forest Service
FSR	Forest Service Road
FWS, USFWS	United States Department of Interior, Fish and Wildlife Service
GIS	Geographic Information System
HHD	Harvest – Habitat Downgraded
HHM	Harvest – Habitat Maintain
HHR	Harvest – Habitat Remove
ICS	Incident Command System
ITR	Individual Tree Removal
LOC	Letter of Concurrence
LSR	Late Successional Reserve
MA-LAA, LAA	May affect, likely to adversely affect
MA-NLAA, NLAA	May affect, not likely to adversely affect
NE	No effect
NEPA	National Environmental Policy Act
NF	National Forest
NP	Nest Patch (often a 300 meter circle around a spotted owl activity center)
NRF	Nesting, roosting, foraging [habitat for spotted owls]
NSO	Northern spotted owl(s)
NWFP	Northwest Forest Plan
PBF	Physical and Biological Features
PCE	Primary Constituent Elements
PCT	Pre-commercial Thinning or Stand Density Management

Acronym	Name
PHR	Provincial Home Range (often a 1. 2 mile radius circle around a spotted owl activity center)
PRMP	Proposed Resource Management Plan (BLM for western Oregon)
RA	Resource Area (United States Department of Interior, Bureau of Land Management)
RA10	Recovery Action 10 (Revised Recovery Plan, NSO, 2011)
RA32	Recovery Action 32 (Revised Recovery Plan, NSO, 2011)
RD	Ranger District (United States Department of Agriculture, Forest Service)
ROD	Record of Decision (NEPA)
ROW	Right of Way (Road Construction)
RR	Riparian Reserve
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS, FS	United States Department of Agriculture, Forest Service
USFWS, FWS	United States Department of Interior, Fish and Wildlife Service
WUI	Wildland Urban Interface

INTRODUCTION

This document transmits the U. S. Fish and Wildlife Service's (Service or USFWS) Biological Opinion (BO) based on our review of the Willamette Province Fiscal Year 2017 activities as described below that are proposed for implementation by the Mt. Hood National Forest (NF), and the Willamette NF and their effects on the northern spotted owl (*Strix occidentalis caurina*) (spotted owl) and spotted owl critical habitat (CH). This document was prepared in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U. S. C. 1531 et seq.). The September 29, 2016, request for formal consultation was received by the Service on October 6, 2016.

This BO is based on the following major sources of information: the September 2016, Biological Assessment (BA) of Likely to Adversely Affect (LAA) Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls in the Willamette Planning Province-Mt. Hood and Willamette NF- FY 2017 (FS 2016); the Northwest Forest Plan (NWFP) (USDA and USDI 1994a); the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994b) (FSEIS); the Service's Biological Opinion (BO) on the NWFP (USFWS 1994); Scientific Evaluation of the Status of the Northern Spotted Owl (Courtney et al. 2004); Recovery Plan for the Northern Spotted Owl (USFWS 2011); Revised Critical Habitat for the Northern Spotted Owl (USFWS 2012a); our files; and informal conversations between the various administrative units and Service staff.

CONSULTATION HISTORY

This BO is "batched" in that it evaluates only those projects that have been determined by the Interagency Level 1 Team (terrestrial subgroup) to be appropriate for this batched-level consultation. Such projects involve activities that are: (1) routine in that administrative units either implement them or approve their implementation almost every year; (2) the standards under which these activities will proceed are well established; and (3) the potential impacts of these activities are well known.

This province-wide, batched approach should provide a better perspective of the aggregate impacts of numerous small projects across the Willamette Planning Province. This effort to address impacts to listed species within the province concurrently will more efficiently use staff time by permitting increased discussion of projects with impacts to listed species while they are still in the planning phase.

The BA, page 18 and 19, states that the proposed projects and their actions will comply with the Record of Decision and the Standards and Guidelines of the NWFP (USDA and USDI 1994a), and with the Willamette and Mt. Hood NF Land and Resource Management Plans.

That is, any activity which is not wholly consistent with the NWFP, as well as the applicable Resource Management Plan, is not covered by the following BO.

The U.S. Forest Service (FS) prepared the BA. The Willamette Province Terrestrial Level 1 Terrestrial Team worked on project review and edits throughout 2016. The final BA was accepted by the Willamette Province Terrestrial Level 1 team and finalized on September 21, 2016. After the completion of signatures, the BA was received by the Service on October 6, 2016.

BIOLOGICAL OPINION

1 Description of the Proposed Action

Except as edited by the Service, the following proposed action is from the BA (FS 2016, pp. 11-26). The proposed action contains eight proposed projects within the Willamette Planning Province (see description of action area below in section 1.5). The proposed projects include: ten acres of habitat removal for a pipeline road on Mt. Hood NF and two quarry expansion projects each removing two acres of suitable habitat (see p. 17 for definition) on the Middle Fork RD of the Willamette NF. Five proposed projects on the McKenzie River RD of the Willamette NF include 6 acres of timber harvest to control rootrot, a 67-acre timber harvest thinning, 50 acres of thinning and danger tree[1] removal to reduce fire risks to a historic site, 1.5 acres of habitat removal to expand a parking lot, and a 275-acre fuel treatment. There are no conceptual projects under this consultation.

A summary of the activities proposed by the administrative units by land use allocation is displayed in Table 1. Further breakdowns of the proposed action can be found in Appendix A, summary tables, Appendix B, Mt. Hood data, and Appendix C, Willamette NFdata. Table 2 documents the conditions under which each activity may proceed.

The proposed action includes all processes needed to plan, evaluate, survey, prepare and complete activities including, but not limited to: falling, bucking, hauling, post-harvest burning, fuel reduction treatments (such as shredding, chipping, masticating, etc. of small diameter fuels), and firewood sales. Firewood cutting may occur at unit landings or decks placed during timber sale operations via the Administrative Unit permit system. It may occur as soon as the unit is released back to the Administrative Unit, but may extend over several seasons.

In addition to the descriptions and conditions in Table 2, the following standards are common to all proposed activities (*i.e.,* any proposed activity that does not meet all of the standards in this section is not addressed by this document).

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[1] A danger tree is any tree or its parts that will fail because of a defect, and cause injury or death to people.

1.1 General Standards

1. To help ensure compliance with the provisions of this consultation and the associated opinion, a wildlife biologist shall participate in the design and implementation of all proposed activities.
2. All proposed activities should consider the analyses for the management of federally listed species contained in pertinent watershed analyses.
3. The removal of a spotted owl nest tree is not included in this document. If a nest tree is a hazard, it should be addressed by a separate consultation under the provisions of emergency consultation.
4. None of the activities in this document would remove spotted owl habitat in areas where post-activity habitat conditions would create a barrier or strong filter to spotted owl movement and survival, in the opinion of the unit wildlife biologist.
5. All activities in Late-Successional Reserves (LSRs) will be consistent with the appropriate LSR Assessment or will be reviewed by the Regional Ecosystem Office for consistency with the NWFP, as required by the NWFP.

   All activities in Adaptive Management areas will be consistent with the appropriate management plan.

6. Activities that change the functionality of suitable habitat addressed by Recovery Action 32 (RA32) are generally avoided in this consultation. This is habitat that meets the definition of suitable habitat as described in the 2011 Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, pp. III-42-47) and in memos that provide guidance to administrative unit biologists in identifying such habitat (USDA Forest Service 2012; US BLM 2012a; US BLM 2012b).

   Projects proposed in such suitable habitat in this document have been reviewed for consistency with the Recovery Plan by the Level 1 Team.

7. When logistically feasible, proposed activities will be modified to avoid disrupting spotted owls. Activities may be moved beyond the disruption distance of known nest sites or potential nest patches, conducted outside the disruption period or implemented during years when survey protocol determines that nest sites are unoccupied.
8. Each administrative unit shall submit to the Service a GIS shapefile or geodatabase (hereafter feature class) of activities addressed by this document, with the exception of Individual Tree Removal. Individual Tree Removal is *only* included in the submitted feature class when it *adversely affects spotted owls* or *adversely affects critical habitat*. The administrative unit shall submit a feature class of such trees to the FWS prior to project implementation unless it is a danger tree. If human health or safety is involved with individual tree removal, submission of this feature class to the FWS may occur after the project has been implemented.
9. At the end of each calendar year, the administrative units will complete a project implementation and monitoring form to show actual levels of effect. This form should be forwarded to the FWS to fulfill the monitoring report requirements.

> Monitoring completes the regulatory requirements of the ESA by documenting the actual effects to the subject species.

Monitoring will ensure that actual levels of effects do not exceed the effects or potential injury anticipated by this document and its associated BO.

Table 1. Summary table of proposed projects broken out by land use allocation.

Admin Unit / Ranger District / Project Name / Activity type — Acres by Land use allocation:	Administratively withdrawn	Adaptive management areas	Congressionally withdrawn	Late-successional reserves	Matrix	Total
Mt. Hood NF total:				**10**		**10**
Barlow RD total:				**10**		**10**
Dog River Pipeline						
Road Construction				10		10
Willamette NF total:	**29**	**275**	**1.5**	**2**	**96**	**403.5**
McKenzie River RD total:	**29**	**275**	**1.5**		**94**	**399.5**
410 Rootrot Removal Pocket total:					6	6
Harvest Habitat Maintain					4.5	4.5
Harvest Habitat Remove					1.5	1.5
Fish Lake Thin and Danger Tree Removal total:	29				21	50
Harvest Habitat Downgrade	18				21	39
Harvest Habitat Maintain	11					11
Knoll Thin total:					67	67
Harvest Habitat Downgrade					55	55
Harvest Habitat Maintain					12	12
Lower 19 Road Hazardous Fuels						
Fuels Treatment		275				275
Tamolitch Pools Trailhead Improvement						
Harvest Habitat Remove			1.5			1.5
Middle Fork RD total:				**2**	**2**	**4**
Carpet Hill Quarry						
Harvest Habitat Remove					2	2
Deception Quarry						
Harvest Habitat Remove				2		2
Grand Total	**29**	**275**	**1.5**	**12**	**96**	**413.5**

Table 2. Description of proposed habitat modification by activity type.

<table>
<tr><th>Activity Type</th><th>Description</th><th>Land Use Allocation</th></tr>
<tr><td rowspan="3">Harvest – Habitat Remove
(HH Remove)</td><td colspan="2">Harvest – Habitat Remove refers to harvest activities which remove current spotted owl habitat such that functionality after treatment is non-habitat. This activity also refers to activities in non-habitat that permanently remove non-habitat that is capable of becoming habitat (e.g., harvesting trees in non-habitat to expand a parking lot).

Unit of measure is acres harvested.</td></tr>
<tr><td>In suitable spotted owl habitat, Harvest – Habitat Remove is the removal of overstory or other habitat components to the point that it no longer supports spotted owl nesting, roosting, foraging, and dispersal. Harvest might be described as clear-cut, removal of habitat, seed tree retention, first or second phase shelterwood cut, selective cut, etc. Habitat lost is canopy cover, roosting and nesting trees, foraging areas, and some large down woody material. Snags and down woody debris may be created as a part of this activity. Units are often burned after harvest to reduce fuel load.

For the purposes of this effects analysis, any activity that results in less than 40% canopy cover is considered habitat removal.

The only exception to Harvest – Habitat Remove in suitable habitat outside of matrix and AMA that is considered in this BA is 0.5 acres that would be removed in a Congressionally Withdrawn area to expand a parking lot and 2 acres that would be removed to expand a rock quarry in an LSR. The expansion in the LSR would only occur if it is consistent with the LSR Assessment or has REO approval.</td><td>Matrix or AMA, with Associated Riparian Reserves</td></tr>
<tr><td>In dispersal habitat, Harvest – Habitat Remove changes the habitat to the point that the stand no longer supports spotted owl roosting and foraging, which are the functions necessary to support movement and survival (for instance: canopy cover would fall below 40% in the treatment unit or coarse woody debris and understory structure would not remain in the unit to support the prey base).

Gap Treatments: Gaps greater than three acres in dispersal habitat and gaps that exceed 10% of the stand are considered "habitat removal" to be included in the HH Remove Activity type unless the unit biologist provides justification for a different determination.

The only exception to Harvest – Habitat Remove in dispersal habitat outside of matrix and AMA that is considered in this BA is 2 acres that would be removed to expand a rock quarry in an LSR. The expansion in the LSR would only occur if it is consistent with the LSR Assessment or has REO approval.</td><td>Matrix or AMA, with Associated Riparian Reserves</td></tr>
</table>

Activity Type	Description	Land Use Allocation
Harvest – Habitat Downgrade (HH Downgrade)	Harvest – Habitat Downgrade and its associated activities modify spotted owl **suitable** habitat to the extent that the stand no longer supports nesting, roosting, or forage but continues to support spotted owl dispersal. Treatment can improve forest health or long term structural characteristics of a stand, or provide commodity outputs. Openings may be created for diversity of habitat as long as overall stand canopy cover and dead wood quantities meet or exceed threshold requirements for dispersal. Gaps greater than one acre are considered "habitat removal". Units with gaps less than or equal to one acre which are greater than 10% of the stand are also considered "habitat removal" unless the unit biologist provides justification for a different determination (as shown in Appendices B-C). Unit of measure is acres harvested.	Matrix or AMA, with associated Riparian Reserves
Harvest – Habitat Maintain (HH Maintain)	Harvest – Habitat Maintain refers to harvest activities which maintain current spotted owl habitat functionality after treatment. Unit of measure is acres harvested.	
	Within spotted owl **suitable** habitat, Harvest – Habitat Maintain is the partial removal of the overstory for commodity outputs and/or forest health where the stand continues to support spotted owl nesting, roosting and foraging immediately after treatment. It might be described as commercial thinning, density management, selective cut, partial cut, mortality (standing) salvage, or under burning for fuel reduction. Average canopy cover within the stand remains above 60% and sufficient coarse woody debris, understory structure and snags remain to support nesting and the prey base. See the USFWS 2007 white paper "Effects of Habitat Thinning on Northern Spotted Owls" p2. Gaps greater than one acre are considered "habitat removal". Units with gaps less than or equal to one acre which are greater than 10% of the stand are also considered "habitat removal" unless the unit biologist provides justification for a different determination (as shown in Appendices B-E).	Matrix or AMA, with Associated Riparian Reserves outside of NSO Critical Habitat
HH Maintain cont.	Within spotted owl **suitable** habitat, Harvest – Habitat Maintain activities described above for Wildlife Urban Interface fire breaks and/or forest health that are consistent with LSR assessments and spotted owl recovery objectives. Gaps greater than one acre are considered "habitat removal". Units with gaps less than or equal to one acre which are greater than 10% of the stand are also considered "habitat removal" unless the unit biologist provides justification for a different determination (as shown in Appendices B-E).	LSR or NSO Critical Habitat

Activity Type	Description	Land Use Allocation
	Within **dispersal** habitat, Harvest – Habitat Maintain can be implemented for forest health, to improve the structural characteristics of a stand or to provide commodity outputs. In some instances, this treatment can have long-term benefits to spotted owls by encouraging late-successional characteristics to develop more rapidly. This treatment maintains the functionality of dispersal habitat after treatment. For example, average canopy cover within the stand remains above 40% and sufficient coarse woody debris and understory structure remain in the unit to support the prey base. Openings may be created for diversity of habitat. In LSRs, the size and dispersal of openings must meet LSR standards and guidelines.	Any Land Use Allocation
Fuels Treatment	Fuels treatments reduce fuel loading around values at risk and/or communities to establish a defensible perimeter for public health and safety in the event of wildfires. Values at risk include protected land use allocations, structures, private land, etc. Communities are adjacent to federal lands and have been threatened by wildfires in the past. Currently there are limited fuel breaks around such areas to assist firefighters in containing the spread of wildfires. Treatments would reduce the vertical and horizontal continuity of fuels. Future maintenance activities will require separate consultation. Treatments may include, but are not limited to, prescribed burning, thinning (removal of trees ≤ 11 inch dbh), whipfelling, mastication, etc. Functionality of suitable habitat may be downgraded to dispersal habitat. Removal of suitable habitat in LSR would meet LSR assessment guidelines or have concurrence from the Regional Ecosystem Office - Late Successional Working Group. These projects will be reviewed by the Level 1 team to see if they meet the intent of this batched consultation. Unit of measure is acres treated.	Any Land Use Allocation
Road Construction	This activity includes new road construction as well as reconstruction of existing roads when such actions require the removal of spotted owl habitat or may cause disruption of known spotted owl sites or potential nest patches. Roadway openings should be consistent with LSR Assessment in LSR land use allocation. Temporary road construction and/or landings are reported as part of the unit acres if the effects determination for both is the same. If, however, the effects determination for the temporary road and/or landing construction is greater than that for the associated activity, then road and/or landing acres are reported separately under this activity type. Unit of measure is acres treated.	Any Land Use Allocation

Activity Type	Description	Land Use Allocation
Harvest in Non-Habitat	This activity generally has "no effect" to spotted owls outside of critical habitat, as no spotted owl habitat is modified. However, in spotted owl critical habitat, harvest in non-habitat may affect critical habitat by delaying the development of dispersal and/or suitable habitat. In critical habitat, harvest in non-habitat is generally proposed to increase the structure in stands that are currently even-aged and have simplified structure. Unit of measure is of acres treated.	Any Land Use Allocation in NSO Critical Habitat

1.2 Definitions

The proposed activities were analyzed, in part, using the following definitions of terms.

1.2.1 General Terms

Habitat: In this consultation refers to both suitable and dispersal habitat (unless specifically identified as either suitable or dispersal habitat).

Canopy Cover*:* The proportion of ground area (forest floor) directly covered by the vertical projection of the tree crowns (aerial view). Canopy cover is to be calculated at the scale of the cutting unit and includes new roads and landings within and adjacent to the cutting unit. It does not include roads outside the cutting units when these roads are not parallel to the edge of the cutting unit, or riparian reserves, unless thinning in riparian reserves.

Non-habitat refers to land which is capable of growing habitat, but does not currently function as either suitable or dispersal habitat.

Suitable habitat**:** Consists of forested stands used by spotted owls for nesting, roosting and/or foraging. Features that support nesting and roosting typically include a moderate to high canopy cover (60-90%); a multi-layered, multi-species canopy with large overstory trees (with a diameter at breast height [dbh] of greater than 30 inches); a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly. This habitat is described as *nesting and roosting habitat* in the revised spotted owl recovery plan (hereafter referred to as the *Recovery Plan*; USFWS 2011, p. A-10).

Foraging habitat generally has attributes similar to those of nesting and roosting habitat, but such habitat may not always support successfully nesting pairs (USFWS 2011, p. A-10). Foraging habitat may include forests with smaller average tree diameters than roosting and nesting habitat (USFWS 2011, p. C-35). Together, these comprise suitable habitat in this document.

Dispersal habitat: *Landscape Scale*: Spotted owls can utilize suitable habitat for movements across the landscape. However, dispersing or nonresident individuals may also use other forested areas that do not meet the requirements of nesting or roosting habitat on a short-term basis. Such short-term dispersal habitats must, at minimum, consist of stands with adequate tree size and canopy cover to provide protection from avian predators and at least minimal foraging opportunities (USFWS 2011, p. A-10). Dispersal habitat is comprised of conifer and mixed mature conifer-hardwood habitats with a canopy cover greater than or equal to 40 percent and conifer trees greater than or equal to 11 inches average diameter at breast height (dbh) with open space beneath the canopy to allow spotted owls to fly. Non-territorial spotted owls use dispersal habitat to roost, forage, and survive until they can establish a nest territory. Juvenile owls also use dispersal habitat to move from natal areas. Dispersal habitat thus includes habitat that will provide some roosting and foraging opportunities during the colonization phase of dispersal. The scale for looking at an area to support dispersing spotted owls is usually much larger than for nesting spotted owls.

Local scale: In this document, the term "dispersal habitat" generally refers to stands that are 40-79 years old and do not currently function as suitable habitat. Spotted owls use dispersal habitat for movement across the landscape as well as movement within the territory.

Territorial scale: If the current amount of suitable (nesting/roosting and foraging) habitat is below 50 percent in the Core Area and/or below 40 percent in the Provincial Home Range of a known or potential site, then the unit biologist evaluated whether all or some of the dispersal habitat in the site territory is necessary for successful site occupation and reproduction. In territories where dispersal habitat is thought to be supporting nesting and rearing of young (i.e. the owl pair is relying on the "next best habitat" due to the low amount of suitable habitat), the effects of treating dispersal habitat are analyzed the same as for treating suitable habitat. The general rationale for this assumption is that dispersal habitat will provide some of the attributes of suitable such as: roosting, foraging, prey and thermal protection around a nest, and habitat to rear young. The amount and quality of dispersal habitat (i.e., its forage attributes), and the amount of deviation below the 40/50 percent thresholds for suitable habitat in the Core Area/Provincial Home Range respectively, influence this rationale for analyzing effects to dispersal habitat functioning as suitable habitat.

Spotted Owl Site: A site known to be occupied at some point between 1990 and the present by a pair of spotted owls or a resident single as defined by the Service's survey protocol (USFWS 2012a: 24-25). The specific site location is determined by the unit biologist based on the best and/or most recent information. A site may be determined to be inactive only in accordance with the current survey protocol.

Potential Spotted Owl Site: An area able to support resident spotted owls (i.e. a potential breeding pair). This is used for determining effects to spotted owls where survey data are insufficient. See Appendix D for a further discussion on potential owl sites.

Nest patch (or Stand): 300 meters (radius circle) around a known or potential owl site, where a spotted owl would be likely to select a nest tree. This is based on habitat usage of spotted owls within the Central Cascades Study Area, located on the Willamette National Forest.

Core area**:** 0.5 mile (radius circle) around a known or potential spotted owl site, which delineates the area most heavily used during the nesting season for nesting, foraging and rearing young. Bingham & Noon (1997, p. 136) defined the core area as that portion of a spotted owl breeding season home range that received disproportionately high use for nesting, roosting and foraging; they suggested that 60-70 percent of spotted owl reproducing season activity occurred in about 20 percent of the home range. Although Courtney *et al.* (2004, p. 5-5) observed that core area sizes varied greatly among spotted owls, Bingham & Noon 1997, Wagner & Anthony 1999, Franklin et al. 2000 and Irwin et al. 2004 collectively suggested a core area of about 500 acres. This consultation will use a 500 acre core area, which is also consistent with the modeling developed for the 2011 Spotted Owl Recovery Plan (USFWS 2001, p C-15).

Home range**:** An estimated area for habitat use of a spotted owl pair. For the Oregon Cascades, this estimate is 1.2 miles (radius circle) around a known or potential spotted owl site (Forsman et al. 1984, p. 18; Meslow and Miller, 1989, p. 2; Thomas et al. 1990 p. 194, Table I1; USDA & USDI, 1994b, p. 12). See Appendix D for a detailed explanation of home range.

1.2.2 Habitat Modification

Habitat Maintained (HHM): Refers to silvicultural activities that alter forest stand characteristics but maintain the components of spotted owl habitat within the stand such that spotted owl life history requirements are supported (i.e. the functionality of the habitat used by spotted owls remains intact post silvicultural activity).

For spotted owl suitable habitat (also known as NRF[2]) a canopy cover of greater than 60 percent along with other habitat elements (e.g. including snags, down wood, dominated by large overstory trees, tree-height class-diversity, and older hardwoods) will be maintained post silvicultural activity to adequately provide for spotted owl nesting, roosting, and foraging within the stand.

For spotted owl dispersal habitat a canopy cover of greater than 40 percent along with other habitat elements (e.g. including snags, down wood, tree-height class-diversity, and older hardwoods) will be maintained after silvicultural activity to adequately provide for spotted owl dispersal.

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[2] Nesting, roosting and foraging (NRF) habitat.

Proposed silvicultural activities will maintain the characteristics of spotted owl suitable and dispersal habitat in affected stands for each site-specific action. In addition, in the case of suitable-maintained, the administrative unit biologist is responsible for assessing the juxtaposition of the affected stand within the surrounding forest landscape[3] to ensure that appropriate effects to spotted owls are documented.

Available scientific literature provides support for the finding that forest stands can be altered in a manner that is not necessarily expected to change the habitat function for spotted owls (Forsman et al. 1984, pp. 16, 17, 57; USFWS 2011, pp. III-15-17; Irwin et al. 2015 entire). Examples of silvicultural activities that may fall into this category are light to moderate thinning, down salvage, individual tree removal, and prescribed burning.

Habitat Downgraded: Refers to silvicultural activities that change spotted owl suitable habitat to dispersal habitat.

Habitat Removed: Refers to silvicultural activities that

- Alter spotted owl suitable habitat such that it no longer supports nesting, roosting, foraging, and dispersal (i.e., suitable habitat becomes non-habitat after treatment) or
- Alter spotted owl dispersal habitat so that the habitat no longer supports dispersal (i.e., dispersal habitat becomes non-habitat after treatment).

1.2.3 Disturbance/Disruption

In the early critical breeding season (March 1-July 15), disturbance and disruption distances are measured from the nest tree (if known) or the edge of a nest patch. Once the young have fledged, generally in the latter part of the breeding season (July 16-September 30), disturbance and disruption distances are measured from the location of the young at time of disruption, if known. If the location of the young is not known, distances are measured from the edge of the nest patch.

Breeding Period: The breeding period for spotted owls is March 1 through September 30. The critical breeding period is March 1 through July 15.

***Disturbance Distance*:** The distance from the project boundary outward within which the action is likely to cause a spotted owl, if present, to be distracted from its normal activity. Except as stated in Table 3, the disturbance distance is 0.25 mile from nesting spotted owls during the breeding period. The unit wildlife biologist may increase or decrease these disturbance distances according to the best available scientific information and site-specific conditions, such as the topography and the duration, frequency and magnitude of the

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[3] Site specific information may reveal a local concern for an owl pair that is relying on the harvest unit. An example: a spotted owl pair's home range contains sub optimal levels of foraging habitat so that any impact, even minor, may contribute to the inability of the spotted owl pair to support successful reproduction.

disturbance. For individual tree removal, it is the Fish and Wildlife Service's opinion that chain saw and heavy equipment noise activities that occur with duration of less than one day are not likely to cause a reduction in breeding success.

***Disruption distance*:** The distance from the project boundary outward within which the action is likely to cause a spotted owl, if present, to be distracted to such an extent as to disrupt its normal behavior and create the likelihood of injury or loss of reproduction. The disruption distance is a subset of the disturbance distance. Proposed activities that would occur within the distances shown in Table 3 during the dates shown, might disrupt the normal behavior patterns of individual spotted owls or breeding spotted owls if spotted owls were present.

The unit wildlife biologist is responsible for ensuring that the correct effects determination has been made for each project. The unit biologist may increase or decrease the disruption distance based on site-specific information, such as topography and the duration, frequency and magnitude of the disturbance or disruption. If a spotted owl site is surveyed to protocol and the spotted owls are determined to be non-nesting, the unit biologist may determine that no disturbance or disruption would occur and lift the associated restrictions on activities within disruption distances during the year of survey.

Table 3. Disturbance and disruption distances for the spotted owl during the breeding period. Footnotes listed on the following page.

Disturbance Source	Disturbance Distance	Disruption Distance	
	Entire Breeding Period (March 1 – September 30)	Critical Breeding Period (March 1 – July 15	Latter Breeding Period (July 16 – September 30
Aircraft: Small fixed-wing aircraft* (Cessna 185, etc.)*	0.25 mile	110 yards	NA
Blasting	1 mile	0.25 mile[1] 100 yards (injury)[2]	100 yards (injury)[2]
Burning (prescribed fires, pile burning)	0 25 mile	0.25 mile[3]	NA
Chainsaws (includes felling hazard/danger trees)	0.25 mile	65 yards[4]	NA
Heavy equipment for road construction, road repairs, bridge construction, culvert replacements, etc. Includes brushing, maintenance, hauling, etc. of non-drivable roads, and road decommissioning.	0.25 mile	65 yards[4]	NA
Helicopter*: Chinook 47d	0.5 mile	265 yards[5]	100 yards[6] (hovering only)
Helicopter*: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	0.25 mile	150 yards[7]	50 yards[6] (hovering only)
Helicopter*: K-MAX, Bell 206 L4, Hughes 500	0.25 mile	110 yards[8]	50 yards[6] (hovering only)
Light maintenance (e.g., road brushing and grading) at campgrounds, administrative facilities, and roads	0.25 mile	NA[9]	NA
Log hauling on open roads	0.25 mile	NA[9]	NA
Pile-driving (steel H piles, pipe piles) Rock Crushing and Screening Equipment	0.25 mile	120 yards[1]	≤ 5 yards (injury)
Tree Climbing	25 yards	25 yards[10]	NA[10]

Footnotes for this table are found on the following page.

Footnotes for Table 3
Disturbance sources and distances in table are for single events based on generalized conditions. In order to determine final effects to spotted owl behavior, including rearing of young in the later non-critical part of the breeding period, unit biologists should consider the amount, frequency and duration of all disturbance sources; current breeding status based on surveys if available; and area-specific factors such as habitat amount and orientation as well as topography. For individual tree removal, it is the Fish and Wildlife Service's opinion that chain saw and heavy equipment noise activities that occur with duration of less than one day are not likely to cause a reduction in breeding success.
[1] Impulsive sound associated with blasts and pile-driving is highly variable and potentially injurious at close distances. We selected a 0.25-mile radius around blast sites as a disruption distance based on observed prairie falcon flush responses to blasting noise at distances of 0.3 – 0.6 miles from blast sites (Holthuijzen et al. 1990, p. 273). We have conservatively chosen a distance threshold of 120 yards for impact pile-driving and rock-crushing operations to avoid potential hearing loss effects and to account for significant behavioral responses (e.g. flushing) from exposure to continuous sounds from impact pile driving. [2] Exposure to peak sound levels that are >140 dBA are likely to cause injury in the form of hearing loss in birds (Dooling and Popper 2007, pp. 23-24). We have conservatively selected 100 yards as an injury threshold distance based on sound levels from experimental blasts reported by Holthuijzen et al. (1990, p. 272), which documented peak sound levels from small blasts at 138 – 146 dBA at a distance of 100 m (110 yards). [3] Based on recommendations presented in *Smoke Effects to Northern Spotted Owls* (USFWS 2008, p. 4). [4] Based on Delaney et al. (1999, p. 67) which indicates that spotted owl flush responses to above-ambient equipment sound levels and associated activities are most likely to occur at a distance of 65 yards (60 m) or less. [5] Based on an estimated 92 dBA sound-contour from sound data for the Chinook 47d presented in Newman et al. (1984, Table D. 1). [6] Rotor-wash from large helicopters is expected to be disruptive at any time during the nesting season due the potential for flying debris and shaking of trees located directly under a hovering helicopter. Hovering rotor-wash distance is based on a 300-ft. radius rotor-wash zone for large helicopters hovering at < 500 above ground level (from WCB 2005, p. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-

Footnotes for Table 3 Disturbance sources and distances in table are for single events based on generalized conditions. In order to determine final effects to spotted owl behavior, including rearing of young in the later non-critical part of the breeding period, unit biologists should consider the amount, frequency and duration of all disturbance sources; current breeding status based on surveys if available; and area-specific factors such as habitat amount and orientation as well as topography. For individual tree removal, it is the Fish and Wildlife Service's opinion that chain saw and heavy equipment noise activities that occur with duration of less than one day are not likely to cause a reduction in breeding success.
yard radius for all other helicopters based on the smaller rotor-span for all other ships. [7] Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USFS 2008, chapters 5, 6). [8] Based on Delaney et al. (1999, p. 74), which concluded that a buffer of 105 m (115) yards for helicopter overflights would eliminate flush responses from military helicopter overflights. The estimated 92 dBA sound contours for these helicopters is less than 110 yards (e.g., K-MAX (100 feet) (USFS 2008, chapters 5, 6), and Bell 206 (85-89 dbA at 100 m)(Grubb et al. 2010, p. 1277). [9] NA = not applicable. Based on information presented in Tempel and Gutiérrez (2003, p. 700), Delaney et al. (1999, p. 69), and Kerns and Allwardt (1992, p. 9), we anticipate that the few spotted owls that select nest sites in close proximity to open roads either are undisturbed by or habituated to the normal range of sounds and activities associated with these roads. [10] Based on Swarthout and Steidl (2001, p. 312) who found that 95 percent of flush responses by spotted owls due to the presence of hikers on trails occurred within a distance of 24 m.
* Aircraft normally use above ground level (AGL) as a unit of measure. For instance to not cause a disruption by medium and small helicopters during the late breeding season, the AGL would be 350 feet. 350 feet AGL would account for 200 foot tall trees that NSOs would be occupying plus the 50 yards disruption distance.

1.3 Implementation

Projects do not have a specific date for completion.

1.4 Action Area

The action area is defined by 50 CFR 402 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the purposes of this consultation, the action area includes lands within the Mt. Hood and Willamette NFs associated with the proposed projects and non-federal and Federal lands within 1 mile of the proposed projects. A one mile buffer of the proposed projects is included in the action area because it is the maximum disturbance distance associated with blasting (Table 4).

The action area occurs with Clackamas, Douglas, Lane, Linn, Hood River, Marion, Multnomah, and Wasco Counties in Oregon (Table 4).

Table 4. Administrative Units and their Respective Counties.

Administrative Unit	Counties
Mt. Hood NF	Marion, Clackamas, Multnomah, Hood River, Wasco
Willamette NF	Marion, Linn, Lane, Douglas

The analysis area includes effects to spotted owl provincial home ranges that extend beyond the action area. For this consultation, the analysis area includes all spotted owl provincial home ranges that occur entirely within 2.4 miles of proposed actions. This is the diameter of a spotted owl provincial home range in the Willamette Province. Spotted owl provincial home ranges that only overlap, but do not occur entirely within the 2.4 mile analysis area, do not have a portion of the home range which overlaps/intersects with the proposed action. Therefore, spotted owl provincial home ranges that do not occur entirely within the 2.4 mile analysis area are not having any modifications to their habitat and they are beyond disruption distances (Section 7.1).

2 Analytical Framework

Effects of the action refer to the permanent or temporary direct and indirect effects of the action on the species and/or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action, occur later in time, but are still reasonably certain to occur.

The Endangered Species Act Consultation Handbook (USFWS & NMFS 1998, p. xvi), states a "*may affect*" determination is required when a proposed action may pose any effects to individuals of a listed species or to its designated critical habitat. When any adverse effects to individuals of a listed species or its critical habitat may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, a "*may affect, likely to adversely affect*" determination is appropriate. However, when effects to listed species or critical habitat are expected to be discountable or insignificant, "*may affect, is not likely to adversely affect*" is the appropriate conclusion. Insignificant effects relate to the size of the impact and should never reach the level where potential injury to a spotted owl would occur. Discountable effects, as described in the consultation handbook, are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

Direct and indirect effects: Direct effects are the immediate consequences of the proposed action. Indirect effects are caused by the action, occur later in time and are reasonably certain to occur.

Interrelated and interdependent actions: Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interrelated actions are related to the Federal action, but do not depend on the Federal action. Interdependent actions are those that might occur independently of the larger action, but which have no independent utility apart from the action under consideration. Interdependent actions depend on the Federal action and have no independent utility apart from the Federal action.

2.1 Analytical Framework for the Jeopardy Determination

The following analysis relies on four components to support the jeopardy determination for each of the species considered in this BO: (1) the Status of the Species, which evaluates the species' range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the species in the action area, the factors responsible for that condition, and the role of the action area in the species survival and recovery; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the species; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the species.

In accordance with the implementing regulations for section 7 and Service policy, the jeopardy determination is made in the following manner: the effects of the proposed Federal action are evaluated with the aggregate effects of everything that has led to the spotted owl's current status and, for non-federal activities in the action area, those actions likely to affect the spotted owl in the future, to determine if, given the aggregate of all of these effects, implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

The following analysis places an emphasis on using the range-wide survival and recovery needs of the species and the role of the action area in meeting those needs as the context for evaluating the effects of the proposed Federal action combined with other relevant effects. In short, a non-jeopardy determination is warranted if the proposed action is consistent with maintaining the role of habitat and the species population in the action area for the species' survival and recovery. The jeopardy determination is made on the range-wide scale of the species.

2.2 Analytical Framework for the Adverse Modification Determination

Section 7(a)(2) of the ESA requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification of critical habitat" was published on February 11, 2016 (USFWS and NOAA 2016). The final rule became effective on March 14, 2016. The revised definition states: "Destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features. "

The destruction or adverse modification analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the range-wide condition of designated critical habitat for a listed species in terms of the key components of the critical habitat that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the *Environmental Baseline*, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the value of the critical habitat in the action area for the conservation/recovery of the listed species; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the value of the affected critical habitat units for the conservation/recovery of the listed species; and (4) Cumulative Effects, which evaluate the effects of future non-federal activities that are reasonably certain to occur in the action area on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the value of the affected critical habitat units for the conservation/recovery of the listed species.

For purposes of making the destruction or adverse modification determination, the effects of the proposed Federal action, together with any cumulative effects, are evaluated to determine if the value of the critical habitat rangewide for the conservation/recovery of the listed species would remain functional or would retain the current ability for the key components of the critical habitat that provide for the conservation of the listed species to be functionally re-established in areas of currently unsuitable but capable habitat.

Note: Past designations of critical habitat have used the terms "primary constituent elements" (PCEs), “physical and biological features” (PBFs) or "essential features" to characterize the key components of critical habitat that provide for the conservation of the listed species. The new critical habitat regulations (USFWS and NOAA 2016, p. 7216) discontinue use of the terms “PCEs” or “essential features” and rely exclusively on use of the term PBFs for that purpose because that term is contained in the statute. To be consistent with that shift in terminology and in recognition that the terms PBFs, PCEs, and essential habit features are synonymous in meaning, we are only referring to PBFs herein. Therefore, if a past critical habitat designation defined essential habitat features or PCEs, they will be referred to as PBFs in this document. This does not change the approach outlined above for conducting the ‘‘destruction or adverse modification’’ analysis, which is the same regardless of whether the original designation identified PCEs, PBFs or essential features.

3 Status of Spotted Owls

The spotted owl was listed as a threatened species in 1990 because of widespread loss of suitable habitat across the species range and the inadequacy of existing regulatory mechanisms to conserve the species (55 FR 26114 [June 26, 1990]). Many populations of spotted owls continue to decline, especially in the northern parts of the species’ range, where populations have declined by as much as 80 percent since 1990. While past and current habitat loss continues to threaten spotted owl populations, even though loss of habitat due to timber harvest has been greatly reduced on Federal lands for the past 2 decades (USFWS 2011, p. vi), increasing competition from the non-native barred owl (*Strix varia)* is now a significant threat to the continued existence of the northern spotted owl (USFWS 2011).

The full Status of the spotted owl is in Appendix E for the efficiency of producing this BO, as the status of the species is produced by the Northern Spotted Owl Consultation Coordination Team and contains extensive references.

Although the following information is in the incorporated Status of the spotted owl, we are including it here to highlight the current condition of the spotted owl population.

There are no current estimates of the total population size of spotted owls because many areas across the range of the species remain unsurveyed (USFWS 2011, p. A-2). Spotted owl demography studies use estimates of fecundity (reproduction) and apparent survival to determine if populations within 11discrete study areas in California (3), Oregon (5), and Washington (3) are increasing, stationary, or decreasing. Spotted owl populations declined range-wide at an estimated rate of 3.8 percent per year from 1985 to 2013 (Dugger et al. 2015, p. 57). The rates of population decline vary by study area, with the greatest rates of decline occurring in Washington and northern Oregon (Dugger et al. 2015, p. 70). The factors that influence spotted owl demography are not fully understood, but habitat quality and quantity, annual weather patterns, and the presence of barred owls are all factors that affect spotted owl survival, reproduction, and local population trends (Forsman et al. 2011, pp. 67-72, Dugger et al. 2015, pp. 93-99). An overall decline in apparent survival rates (the probability that an owl will survive from one year to the next) is the most significant factor driving the declining population trends across the range of the species (Forsman et al. 2011, pp. 63-64). There is now strong evidence that barred owls have negatively affected spotted owl populations, primarily by decreasing apparent survival and increasing rates of local territory abandonment (Dugger et al. 2015, p. 58).

The loss of nesting, roosting, and foraging habitat was a major cause of the spotted owl's decline over the past century. Habitat loss is still considered to be a threat to the spotted owl, as habitat continues to be lost to wildfires, timber harvest, and other natural disturbances (Davis et al. 2016, p. 36). Monitoring of spotted owl habitat in the NWFP area from 1993 to 2012 indicated nesting/roosting habitat declined from 9.09 million acres to 8.95 million acres on Federal lands during the monitoring period, a loss of about 1.5 percent (Davis et al. 2016, p. 5). Across all lands (Federal and non-federal), habitat declined from approximately 12.5 million acres to 12.1 million acres, a loss of 3.4 percent (Davis et al. 2016, p. 22). Wildfire has been the major cause of habitat loss on Federal lands, while timber harvest is the primary cause of habitat loss on non-federal lands. Although the maintenance, enhancement and restoration of NRF habitat is a key element in the conservation of spotted owls, it may no longer be the primary factor affecting population stability in either the short or long term due to the rapidly increasing trend of barred owl populations (Davis et al. 2011, p. 18).

The 2011 Revised Recovery Plan for the Northern Spotted Owl (Recovery Plan)(USFWS 2011, entire) identified past and ongoing habitat loss and competition from barred owls as the primary threats to the survival and recovery of spotted owls at this time. The Recovery Plan includes Recovery Actions specific to addressing barred owl competition and habitat loss. For barred owl competition, Recovery Actions include the implementation of a barred owl removal experiment, management to reduce the effect of barred owls on spotted owls, and the retention and restoration of high quality spotted owl habitat to buffer the effects of barred owl competition in the short term (USFWS 2011, p. III-65, 67), While long-term maintenance and restoration of additional habitat on Federal lands, as envisioned under the NWFP, remains essential to the spotted owl's recovery (USFWS 2011, pp. III-41), additional conservation measures addressing competition from barred owls that were not envisioned under the NWFP may ultimately be needed to recover the species in the face of the barred owl expansion into the Pacific Northwest (Dugger et al. 2011, p. 99, USFWS 2011, p. III-65).

3.1 Supplemental Information

Below is additional information to supplement the Northern Spotted Owl Consultation Coordination Team status of the species:

3.2 Effects from Disturbance

The Level 1 Team has concluded that noise, smoke and human presence in the canopy can result in a significant disruption of breeding, feeding, or sheltering behavior of the spotted owl such that it creates the potential for injury to individuals (i.e., injury in the form of harassment). For a significant disruption of spotted owl behavior to occur as a result of disturbance caused by a proposed action, the disturbance and the spotted owl(s) must be in close proximity to one another (see Table 3, USFWS 2003, entire). Human presence on the ground is not expected to cause a significant disruption of behavior because spotted owls do not seem to be startled by those situations (USFWS 2003, p. 14, USFWS 2005b, p. 2).

Spotted owl reactions to smoke and close human presence in the canopy, and excessive noise levels at or in the immediate vicinity of spotted owls are expected to include the following: flushing from the nest site, which would leave eggs or young exposed to predation; causing a juvenile to prematurely fledge, which would increase its risk of predation; interrupting foraging activities, which would result in the reduced fitness or even mortality of an individual; or disrupting roosting activities which would cause a spotted owl to relocate. A spotted owl that may be disturbed at a roost site is presumably capable of moving away from disturbance without a significant disruption of its behavior. Spotted owls forage primarily at night. Therefore, projects that occur during the day are not likely to disrupt its foraging behavior. The potential for effects is mainly associated with breeding behavior at an active nest site. The breeding season for spotted owls within the action area is March 1 through September 30.

In the Central Cascades, 86 percent of spotted owl young fledge (*i.e.,* leave the nest tree) by June 30 (Turner 1999, page 2). Based on Forsman et al. (1984, p. 37) observations that most young spotted owls were capable of short, clumsy flights between trees within one week after fledging, it is likely that two weeks would allow sufficient development of owlets to achieve sustained flight. Therefore, the spotted owl critical period in the Willamette Planning Province is considered to be March 1 through July 15. After July 15, it is presumed that most fledgling spotted owls are capable of sustained flight and can move away from harmful disturbances. Therefore, disturbance from most proposed actions within disturbance distances of an active nest during the latter portion of the breeding period (between July 16 and September 30), ***may affect, but is not likely to adversely affect***, spotted owls (see Table 3).

However, disturbances associated with the use of large helicopters, such as a Chinook 47 D, are considered to have a greater impact than smaller helicopters, due to the intensity of the noise and wind disturbance associated with rotor wash. Blasting is also considered to have a greater impact on spotted owls due to the noise intensity. Thus, activities requiring the use of large helicopters or blasting within disruption distances of an active nest ***may affect and are likely to adversely affect***, nesting spotted owls during the entire breeding period (March 1 – September 30).

Disturbance from proposed actions conducted outside of the breeding period (between October 1 and February 28), or more than the disturbance distances from a spotted owl activity center or unsurveyed suitable habitat during any time of the year, or in surveyed unoccupied habitat during any time of the year, would have ***no effect*** on spotted owls.

3.3 Effects from Habitat Modification

3.3.1 Territorial spotted owls

Habitat modification can remove habitat or maintain the current habitat functionality. Habitat modification activities that reduce the quality of suitable or dispersal habitat while retaining the structural characteristics of the affected stand that still allow it to support its original function are said to maintain habitat. This generally includes a reduction in canopy cover to approximately >60 percent in suitable habitat and ≥40 percent in dispersal habitat, when other habitat elements (including snags, down wood, tree-height class-diversity, and older hardwoods) are retained, post-harvest, at levels that provide for the original function of the stand. The administrative unit biologist is responsible for ensuring prescriptive activities account for these non-conifer structural elements and making correct effects determinations for each individual action. Since the functionality of this habitat is retained, the impacts on the ability of spotted owls to nest, forage or move across the landscape are anticipated to be insignificant. In some cases the juxtaposition of the affected stand within the surrounding forest landscape may contribute to the inability of a spotted owl pair to support successful reproduction. An example is treatment of suitable or dispersal stands within a nest patch.

Generally, removing or maintaining dispersal habitat is not expected to immediately affect territorial spotted owls, as these owls concentrate on suitable habitat to support their life needs. If treatment in dispersal habitat will slow down the development of dispersal habitat into suitable habitat, then the treatment may negatively affect territorial spotted owls from slowing down the development of suitable habitat to support a home range. In areas where there are no current home ranges, dispersal habitat may be important for the development of future home ranges to support territorial spotted owls.

The removal of suitable habitat has an indirect effect on spotted owl populations by reducing the amount of potential nesting or foraging habitat. These effects on a local spotted owl population are greater when the amount of suitable habitat remaining post-harvest is limited in the area. Loss of nesting structure may reduce the number of breeding pairs if other nesting habitat is limited. Loss of foraging habitat could reduce the amount of food available to nearby adult and juvenile spotted owls, which could affect their survival or ability to reproduce if other foraging options are limited.

Downgraded suitable habitat is expected to preclude spotted owl nesting for an undetermined period of time: generally 10 to 30 years depending on the post-harvest condition of the stand. However, downgraded suitable habitat still would be expected to support the movement of spotted owls across the landscape and provide some foraging opportunities.

Modification that maintains unoccupied suitable habitat is expected to have less of an impact on spotted owls because no individual territorial spotted owls would be directly affected by the treatments and because the function of these stands would be retained, thus limiting any indirect effects.

The removal or downgrading of unoccupied suitable habitat would not directly injure individual territorial spotted owls. However, the removal or downgrading of unoccupied suitable habitat could preclude future spotted owl occupancy for a period of time, thus indirectly negatively affecting the species. This effect could last for 80 years or more depending on the post-treatment condition of the stand. Modification that maintains unoccupied suitable habitat is expected to have less of an impact on spotted owls because no individual territorial spotted owls would be directly affected by the treatments and because the function of these stands would be retained, thus limiting any indirect effects.

3.3.1.1 Beneficial Effects from Treatments

There may also be short and/or long-term beneficial effects associated with habitat modification, particularly thinning in reserves, when they are designed to encourage faster development of late-successional characteristics. Thinning within non-matrix lands is implemented to increase growth rates and crowns by reducing competition for the retained trees, to make currently unsuitable nest trees and trees of marginal habitat quality become suitable nest trees sooner than without treatment. These thinning treatments also encourage currently suitable trees to maintain full crowns and branch development, and to create holes and gaps in the stand that will increase stand complexity and improve habitat by creating greater stand diversity for spotted owls and their prey base. In some cases, a short term adverse effect to the spotted owl by Harvest - Habitat Remove may result in a long term benefit by providing structural diversity.

3.3.1.2 Home Range – Potential Impacts

Habitat modification within the home range can directly and indirectly influence the likelihood of spotted owls occupying, breeding and persisting at known and potential sites. When suitable habitat is reduced to below 40 percent of a home range, spotted owl occupation and breeding success is likely to be diminished, including a potential for injury to spotted owls due to habitat loss.

Home range size is influenced by the degree of forest fragmentation and the proportion of mature and old forest. The size of home ranges increase in more fragmented landscapes as well as those that contain a smaller proportion of mature and old forest (Courtney et al. 2004, pp. 5-5, 5-6). On the Willamette Planning Province, the home range of spotted owls is generally a 1.2 mile radius circle or about 2,955 acres (Thomas et al. 1990 p. 194, Table I1; USDA & USDI, 1994b, p. 12; Forsman et al. , 1984, p. 18, Table 1 and p. 20; Meslow and Miller, 1989, p. 2).

Analysis indicates that injury to spotted owls due to habitat modification could occur when suitable habitat is removed and, after treatment, comprises less than 40 percent of the home range (USFWS 2005a entire). Bart and Forsman (1992, pp. 95, 98), Bart (1995, pp. 944, 945), Ripple et al. (1997, pp. 151, 155, 156, 157), and Forsman et al. (2005, pp. 365, 372-375) suggest that as the amount of suitable habitat in a spotted owl's home range decreases, there is a corresponding decrease in the capability of the site to provide for owl occupancy, reproduction and survival. Bart and Forsman (1992, pp. 98, 99) found that areas with less than 20 percent suitable habitat had few spotted owls and less reproductive success than areas with more suitable habitat. Bart and Forsman (1990, p. 2 and fig. 2) found that areas with less than 40 percent older forest had significantly few young fledged per pair. In Ripple et al. (1997, pp. 151, 155, 157), results suggest that spotted owl reproductive rates may be directly related to the proportion of old forest in the landscape. Based on these studies, it is likely that at least 40 percent or higher suitable habitat is necessary for maintaining spotted owl life history functions at the home range scale. Site-specific conditions may warrant deviations from this assumption.

Activities that maintain the extent and function of suitable habitat within a home range (such as light to moderate thinning) are generally not likely to result in adverse effects to spotted owls. At some sites, younger stands of foraging habitat without potential nest trees are essential to occupation and reproduction of spotted owls because nesting, roosting and forage (i.e., suitable) habitat comprises less than 40 percent of the home range and less than 50 percent of the core area. Downgrading of such forage-only habitat to dispersal habitat may result in effects similar to the downgrading of nesting, roosting and forage habitat, including adverse effects and potential injury to spotted owls.

3.3.1.3 <u>Core Area (0.5 miles) – Potential Impacts</u>

Habitat modification within the core area can directly and indirectly influence the likelihood of spotted owls occupying, breeding and persisting at known and potential sites. Breeding behavior, including rearing of young, is more affected by habitat conditions at this scale compared to the home range. When suitable habitat is removed to below 50 percent within the core area, spotted owl occupation and breeding success is likely to decline, including a potential for injury to spotted owls.

Rosenberg and McKelvey (1999, entire) reported that spotted owls are “central place” animals with habitat use focused on the core area. In the Willamette Province, the core area of spotted owls is generally a 0.5 mile radius circle or 503 acres. Studies consistently show that the amount of mature and old forest is an important predictor of site occupancy by spotted owls. This finding is particularly acute at the spatial scale of a spotted owl core use area (USFWS 2009, pp. 35-44). Bingham & Noon (1997, p. 136) suggested that 60-70 percent of spotted owl activity during the nesting season occurred in about 20 percent of the home range. Habitat-fitness and landscape models have demonstrated the importance of habitat amount within core areas. For example, Meyer et al. (1998, pp. 5, 36, 47) examined landscape indices associated with spotted owl sites versus random plots on BLM lands throughout Oregon. Across the provinces, landscape indices highly correlated with the probability of spotted owl occupancy included the percent of older forest (30 percent) within the 500 acres surrounding the site.

In their northwest California study, Zabel et al. (2003), as discussed in USFWS 2009, pp. 40, 41, and Figure III. C. 5), found that the highest probability of occupancy occurred when the core area scale consisted of 60 to 70 percent nesting-roosting habitat and 30 to 40 percent foraging habitat. The averages for all combinations of habitat associated with a high probability (>0.70) of occupancy were 48 percent nesting-roosting habitat and 28 percent foraging habitat.

In their southern Oregon study area, Dugger et al. (2005, pp. 874-877) showed that when spotted owl core areas had at least 50-60 percent older forest habitat, spotted owl fitness (i.e., survival and reproduction) was relatively higher than in core areas with lesser amounts.

In summary, habitat composition in spotted owl core areas varies by region and study. Based on the above studies, this consultation assumes that it is necessary for a spotted owl core area to have 50 percent or more suitable habitat to maximize spotted owl life history functions. The 50 percent threshold seems to measure when a significant impairment of spotted owl life history functions is most likely to occur. This assumption and the corresponding threshold value rely largely on research conducted by Dugger et al. (2005 entire), including unpublished habitat-fitness models.

Activities that maintain suitable habitat within a core area (such as light to moderate thinning) are generally not likely to have adverse effects to spotted owls, although site-specific conditions factor into this determination. At some sites, younger stands of foraging habitat without potential nest trees are essential to occupation and reproduction of spotted owls because nesting, roosting and forage (i.e., suitable) habitat comprises less than 40 percent of the home range and less than 50 percent of the core area. Downgrading of such forage-only habitat to dispersal habitat may result in effects similar to the downgrading of nesting, roosting and forage habitat, including adverse effects and potential injury to spotted owls.

3.3.1.4 <u>Nest Patch– Potential Impacts</u>

Habitat modification within the nest patch is likely to directly and indirectly affect the occupancy, breeding and persistance at known and potential sites. Breeding behavior, especially selection of a suitable nest tree or trees, predator defense of the nest tree and rearing of young is more affected by habitat conditions at this scale compared to the home range or core area. When forest habitat is downgraded or removed within a nest patch, spotted owl occupation and breeding success is likely diminished, including a potential for injury to spotted owls due to habitat loss.

The rationale for determining effects due to habitat removal in the nest patch is based on the importance of spotted owls selecting and maintaining nest trees (including alternate nest trees) and an immediate area needed for rearing of young. These activities are increasingly important near a nest tree.

Removal of any suitable or dispersal habitat within a 300 meter radius nest patch would likely result in an adverse effect and may potentially injure spotted owls, depending on the amount of habitat removed. Similarly, typical light to moderate thinning of any suitable or dispersal habitat in the nest patch would likely result in an adverse effect to spotted owls. Potential injury of spotted owls due to habitat loss can depend on the amount of habitat removed or suitable habitat degraded.

The best available information (Thomas et al. 1990, p 62 and Appendix D; Hershey 1995, pp. 28, 29, 52, 53; Courtney et al. 2004, pp. 5-16 thru 5-18) indicates the two key elements of spotted owl habitat within a nest patch to be: (1) canopy cover of dominant, co-dominant and intermediate trees (conifers and hardwoods); and (2) quality and amount of down wood. A primary basis for determining the effects of thinning in a nest patch is a review of management recommendations provided by Glenn et al. (2004, pp. 48, 49) and Meiman et al. (2003 pp. 1259-1261) for a no-harvest strategy (including thinning) in the immediate area of a spotted owl nest site.

Some activities in a nest patch may warrant an effects determination of "*may affect, not likely to adversely affect (NLAA)*" spotted owls. In forest stands likely to be used by spotted owls, management activities implemented outside of the breeding season and that retain the current condition of these attributes within a nest patch may be NLAA especially when total habitat modification occurs in insignificant amounts. Some examples of such activities are: road decommissioning, trail and road maintenance, culvert replacement, manual vegetation maintenance, special forest product removal, limited hazard tree removal, and, possibly, some light intensity fuels reduction treatments to reduce fire risk.

Salvage of dead standing and down trees after stochastic events such as wind-throw and wildfire may also reasonably warrant a "*may affect, not likely to adversely affect*" determination if the amount of removal is low and sufficient amounts of these habitat attributes are retained. Additionally, activities in non-habitat may have the same "may affect, not likely to adversely affect" determination, depending on treatment intensity and its effect on future habitat trajectories.

3.3.1.5 <u>Summary of Home Range, Core Area, and Nest Patch - Potential Impacts</u>

Table 14 summarizes the determination of effects at the home range, core area, and nest patch scales described above. In determining the effects of activities on spotted owls, site- and activity-specific information may result in different effects determinations from this general analytical framework. These "thresholds" are not absolute, but a starting point for the analysis of effects to spotted owls. Each owl site is evaluated independently and site-specific factors may indicate that a different determination is warranted.

Table 5. Summary of effects determinations to spotted owl sites based on habitat conditions in the nest patch, core area and home range as a result of habitat treatment.

Current Habitat	Habitat after treatment Habitat removal or downgrading	Effect[1]	Potential for Injury[1]
Nest patch – any habitat condition	Nest patch – any habitat condition after treatment	LAA	Yes
Scenarios below are for treatments outside the nest patch and where suitable habitat is removed or downgraded to dispersal habitat.			
Core area contains > 50% suitable habitat and Home range contains > 40% suitable habitat	Core area contains > 50% suitable habitat and Home range contains > 40% suitable habitat	LAA	No
	Core area contains > 50% suitable habitat and Home range contains < 40% suitable habitat	LAA	Likely
	Core area contains < 50% suitable habitat and Home range contains > 40% suitable habitat	LAA	Likely
	Core area contains < 50% suitable habitat and Home range contains < 40% suitable habitat	LAA	Likely
Core area contains > 50% suitable habitat and Home range contains < 40% suitable habitat	Core area contains > 50% suitable habitat and Home range contains < 40% suitable habitat	LAA	Likely
	Core area contains < 50% suitable habitat and Home range contains < 40% suitable habitat	LAA	Likely
Core area contains < 50% suitable habitat and Home range contains > 40% suitable habitat	Core area contains < 50% suitable habitat and Home range contains > 40% suitable habitat	LAA	Likely
	Core area contains < 50% suitable habitat and Home range contains < 40% suitable habitat	LAA	Likely
Core area contains < 50% suitable habitat and Home range contains < 40% suitable habitat	Core area contains < 50% suitable habitat and Home range contains < 40% suitable habitat	LAA[2]	Likely[2]
This table shows common scenarios analyzed. Site-specific conditions may result in different effects determinations for a specific site based professional judgment.			
[1] Effects determinations, including potential for injury due to habitat loss, apply both to known sites and potential sites. [2] Survey data and other local information may show known or likely resident pairs at known sites with habitat conditions below the thresholds specified above. In such instances, even though pre-activity conditions were already below thresholds, activities could result in a "*may affect, likely to adversely affect* (LAA)" determination, including the potential for injury due to habitat loss.			

3.3.2 Dispersing spotted owls

Removal of dispersal habitat is expected to reduce spotted owl movement through the treated stand(s). Thus the ability of spotted owls to move across portions of the landscape where dispersal habitat has been removed depends entirely on the habitat condition of the surrounding lands.

Removing suitable habitat will eliminate foraging and roosting opportunities, in addition to reducing spotted owl movement through the treated stand(s). Downgrading suitable habitat will also result in limited foraging and lack ample protection from avian predators and weather while roosting. Downgrading suitable habitat is expected to still supporting spotted owl movement. Thus again the ability of spotted owls to move across the landscape, with sufficient foraging opportunities and roost sites, near where habitat has been removed depends entirely on the habitat condition of the surrounding lands.

Maintaining dispersal or suitable habitat should allow spotted owls dispersing to continue to use those stands for dispersal since the function of the stand to support dispersing spotted owls is expected to be retained.

See above section, 3.3.1, for description of maintaining suitable and dispersal habitat and section 3.3.1.1 for beneficial effects from treatments.

3.3.3 Considerations for local impacts on Spotted Owl Prey Species

Some spotted owl primary prey species, such as northern flying squirrels (Holloway and Smith 2011, entire) will avoid regeneration harvests post-treatment. This is anticipated due to the reduction in habitat features that are important to these species, including canopy cover, mid-story canopy, snags, and down coarse wood in harvested areas. These harvested areas will become much more inhospitable to flying squirrels which are tied to complex mid-story canopies. Red tree vole populations will be impacted as well, due to removal of nest structures, intact canopies and their food source. Populations of woodrats and brush rabbits may increase after regeneration harvests, as these species regularly occur in early seral habitats (Maser et al. 1981, pp. 128-129; Williams et al. 1992, p. 210; Innes et al. 2007, p. 1528).

Spotted owl prey species will be affected by the thinning of young stands. Effects of thinning on the primary prey species of spotted owls are discussed below.

3.3.3.1 Flying squirrels

Northern flying squirrels comprise approximately 50 percent of the prey biomass in diets of spotted owls in the region of the analysis area (Forsman et al. 2004, p. 219). The vast majority of studies indicate that thinning young stands (similar to those proposed for thinning under this consultation) causes a decrease in squirrel densities, at least in the near term (11-13 years after harvest; Manning et al. 2012, pp. 120-123). Some studies have not found any significant short-term differences in densities, but meta-analysis demonstrated that these studies lacked the statistical power or proper research design to support their assertions (Holloway and Smith 2011, pp. 670-672). See Manning et al. (2012, entire) and Wilson and Forsman (2013, entire) for a thorough review of research on the effects of thinning young stands on densities of northern flying squirrels.

Thinning substantially reduces the abundance of large live trees and large snags, habitat features which appear to be among the most important determinants of habitat quality for flying squirrels (Manning et al. 2012, p. 122). The abundance of hypogeous fungi and mid-story structural complexity (and associated protective cover that it provides on the glide path of flying squirrels) have been suggested as additional drivers of flying squirrel densities. However, these hypotheses have not been tested (Manning et al. 2012, p. 121).

Thinning treatments proposed under this consultation promote mid-story development. They are designed to reduce inter-tree competition and therefore accelerate the development of large live trees, which eventually turn into large snags. Over the long term, thinning young stands should therefore cause an improvement in the habitat of northern flying squirrels. However, the length of time between thinning and recovery of flying squirrel habitat suitability in young stands is unknown (Wilson and Forsman 2013, p. 87).

Wilson (2010, p. 140) also reported most thinning is likely to suppress flying squirrel populations for several decades, but expected the eventual long-term benefits of variable-density thinning for squirrels to be positive. While an emphasis on developing mid-story tree layers is critical if the goal is to accelerate late-seral conditions and promote prey for spotted owl, there can be short-term effects to flying squirrels. Wilson (2010, p. 99) states that "Variable-density thinning had a negative effect on flying squirrel populations during four out of the first five years following treatment, but not significantly so after that period. Likewise, there was an additional significant forest interaction with thinning during 1994 and 1996, but not beyond that point. This supported the conclusion that squirrels recovered from the short-term effects of thinning within 3-4 years post-thinning as reported by Carey (2001). "

Wilson (2010, pp. 139-140) suggests a few considerations to reduce short-term effects to flying squirrels while trying to create more forest complexity that would benefit them in the long-term. The proposed action incorporates some of those considerations via the aggregate and dispersed retention features, including:

- retention of existing large decadent trees and snags;
- retention of no-treatment areas (e.g., "skips" and Riparian Reserves) to provide travel corridors from adjacent late seral habitats and across the landscape;
- retention of a range of tree size classes throughout the stand;
- improvement of foraging opportunities by promoting the development of understory and shade-tolerant tree species throughout the stand; and
- maintenance of canopy cover within the stands (e.g., lightly and moderately thinned areas) which would provide protective cover from predators, as well as provide a tree density that allows squirrels to adequately glide between trees and move through a stand in order to access foraging areas.

Sollmann et al. (2016, abstract) offers the following "Whereas thinning had negative effects on northern flying squirrel density on the scale of a thinning treatment unit, our results suggest that these effects were largely absorbed by the heterogeneous landscape, as animals shifted their distribution into un-thinned areas without a decline in overall density. This highlights the need to incorporate the landscape context when evaluating the effects of forest management on wildlife. "

3.3.3.2 <u>Woodrats</u>

Woodrats comprise approximately 20 percent of the biomass in spotted owls' diets in the region of the analysis area (Forsman et al. 2004, p. 219). Mixed results have been reported in studies that examined effects of thinning on woodrats. Dusky-footed woodrats occur in a variety of conditions, including both old, structurally complex forests and younger seral stages, and are often associated with streams (Carey et al. 1999, p. 73; Williams et al. 1992, pp. 207-208; Sakai and Noon 1993, pp. 376-378; Hamm and Diller 2009, pp. 100-101). Research has suggested that thinning or associated practices (*e.g.,* burning slash piles) could be detrimental to dusky-footed woodrats if it reduces hardwoods, shrubs or downed wood, yet treatments could ultimately benefit woodrats if they result in growth of shrubs or hardwoods over time (Williams et al. 1992, p. 210; Innes et al. 2007, p. 1528).

There have been no studies addressing bushy-tailed woodrat occurrence in or near the action area. In the dry forests of eastern Washington, bushy-tailed woodrats are more abundant in forests with more large snags, dwarf mistletoe brooms, and partly decayed logs. Incidental loss of these habitat features as a result of thinning may cause a decrease in bushy-tailed woodrats; however, this hypothesis has not been tested (Lehmkuhl et al. 2006, pp. 374-375).

3.3.3.3 <u>Rabbits and hares</u>

Brush rabbits and snowshoe hares collectively comprise approximately 10 percent of the diet of spotted owls in the region of the analysis area (Forsman et al. 2004, p. 219). Brush rabbits, as their name implies, occur in thickets and other brushy habitats (Maser et al. 1981, pp. 128-129). Thinning treatments and regeneration harvests promote brushy habitat, and by extension populations of brush rabbits. Snowshoe hares inhabit mature and immature coniferous forests (Maser et al. 1981, p. 124). Although no studies on the effects of forest management practices on snowshoe hares have been conducted in western Oregon, research in the panhandle of Idaho indicates that thinning and clearcut treatments cause a short-term (10-15 years) decrease in snowshoe hare populations, but populations of hares are similar or greater than unmanaged mature forests within 15-40 years (Thornton et al. 2012, pp. 136-138).

3.3.3.4 <u>Red tree voles</u>

Red tree voles comprise approximately 2 percent of prey biomass in the diet of spotted owls in the region of the analysis area (Forsman et al. 2004, p. 219). This arboreal species also appears to be negatively impacted by thinning. From Wilson and Forsman (2013, p. 83):

"Small trees in young forests generally have insufficient food resources (conifer needles) in a single tree to support breeding females, so individuals often forage in multiple trees surrounding their nests (Swingle and Forsman 2009). In closed-canopy forest, they can simply travel across interlocking branches to reach adjacent trees. Thinning breaks these connections and voles must travel down the bole and across the ground to reach other trees. This not only increases their energetic demands, it also puts them at additional exposure to predation. Second, red tree voles build nests of small twigs and conifer needles on platforms created by dwarf mistletoe, epicormic branching, forked boles, and other irregularities in tree-branching patterns. If trees with complex structure are removed during thinning, it may greatly reduce the ability of young tree voles to find suitable nest substrates. Third, young tree voles have limited dispersal ability, and the absence of red tree voles across much of northwest Oregon suggests that they may not be able to disperse across broad areas of intensively managed forest (Maser et al. 1981). "

Wilson and Forsman (2013, pp. 84-85) recommend several relevant strategies to reduce known and potential negative effects of thinning on spotted owl prey:

- Accelerate and monitor mid-story development by maintaining the desired balance of understory seedlings and saplings through underplanting, early thinning of saplings, and patchy brush control, where necessary.
- Include very young (<25 year-old) stands in the mix of stands targeted for restoring late-seral forest.
- Retain some young high-density forest on the landscape. Manning et al. (2012 pp. 121-123) also recommend this action, emphasizing management for connectivity of unthinned, young stands.
- Experimentally evaluate alternative prescriptions to thinning, specifically those that focus solely on maintaining untreated "skips" (i.e., patches of trees left unthinned) and creating gaps (removing patches of trees).

With the habitat preferences of prey species in mind, unit biologists have determined whether proposed silvicultural treatments would maintain or downgrade spotted owl habitat. The likelihood and degree of effects to spotted owl prey species will vary based on site-specific conditions, such as the intensity and magnitude of treatments.

3.3.3.5 Prescribed Fire

Fire has both short and long-term negative and beneficial effects to small mammals, depending on the species and the severity of fire (Fontaine and Kennedy 2012, entire). Some small mammals may be directly impacted due to smoke or the inability to escape. Other small mammals may not be affected if they are mobile, protected within large downed coarse wood, or able to move underground or up a tree. However, there may be long-term benefits from a low intensity burn in that the expected increased plant vigor, forage production, and tree mortality resulting from spring burning could facilitate cavity creation and resultant denning opportunities. Another expected benefit is the likely decrease in potential for a stand replacement event in the drier forests found within the action area.

3.3.4 Barred Owls in the Action Area

While Appendix E summarizes information on the range-wide status of the species for spotted owls, additional information is provided in this section on the threat of barred owls relative to the action area.

The Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011: pp. III-62-68) identifies competition from the barred owl as an important threat to the spotted owl. Since barred owls are more aggressive and more habitat generalists but also use the same habitats and prey as spotted owls, they are believed to be out competing spotted owls for habitat and food (USFWS 2011: p. III-62-68, Wiens 2012: Abstract). Within the demographic study areas, there has been an almost steady increase in the number of barred owls as measured by the proportion of spotted owl sites with barred owls detected, with as many as 60 percent of the spotted owl sites having barred owls detected (Forsman et al. 2011, p. 80, *see Figure 1*). Forsman et al.

(2011, pp. 69-70) found evidence barred owl detections were important sources of variation, and had negative effects on spotted owl apparent survival and recruitment.

The BO for the BLM Proposed Resource Management Plan (PRMP) states "In the course of this PRMP section 7 consultation process during the last three years, and since publication of the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011; recovery plan), it has become ever clearer that the spotted owl is most threatened by competition with the increasingly common barred owl. Although habitat loss due to timber harvest and wildfire remains an important long term threat to the spotted owl, the Service now believes this threat is secondary in importance to the conservation of the spotted owl" (USFWS 2016b: p. 4).

Dugger et al. (2011: entire) modeled extinction and colonization rates for spotted owl pairs in the South Cascade Demographic Study Area where barred owls were detected on some home ranges. They found that extinction rates for spotted owls increased with decreasing amounts of old forest in the core area, and that the effect was 2-3 times greater when barred owls were detected. They also found that colonization rates for spotted owls decreased as the distance between patches of old forest increased (i.e. increased habitat loss and fragmentation) and that barred owl presence similarly decreased the rate of colonization of spotted owl pairs. They concluded that conserving large blocks of contiguous old-forest habitat was important for reducing interference competition between the two owl species. They mapped old-forest habitat as generally >100 years of age with trees DBH >35 cm (Dugger 2012. Page 1). Wiens (2012, pp. 45-49) also found that the relative probability of spotted owls selecting a location for reproduction was reduced if the location was in close proximity to the core-use area of a barred owl.

Locally, the Cascades Resource Area-BLM tries to survey its known spotted owls annually. During 2015, barred owls were documented in 39 (71%) of the 55 known spotted owl sites surveyed. Barred owl numbers have been increasing substantially each year within their data set. In 2007, it was 21 percent, 2010 was 48 percent, and 2013 was 68 percent. There were 23 known spotted owl sites occupied by barred owl pairs during the 2015 survey year. Single barred owl responses attributed for the remaining 16 sites. In addition, there were 21 pairs and 92 single barred owl detections not associated with known spotted owl sites. Seventeen barred owl juveniles were detected during 2015, of which 10 were in known spotted owl sites. In contrast, 1 juvenile spotted owl was detected.

There is concern that timber harvest and other silvicultural activities may directly or indirectly affect the interaction between barred owls and spotted owls and increase the competitive advantage for barred owls. The three areas of concern frequently mentioned are: a) logging may expand the range of barred owls; b) silvicultural treatments that thin forests, create early seral habitat, or create edge habitat may favor barred owls over spotted owls; and c) logging that reduces the amount of older forests may increase the competition between the two species by reducing the amount of preferred habitat available. Each concern is addressed individually below.

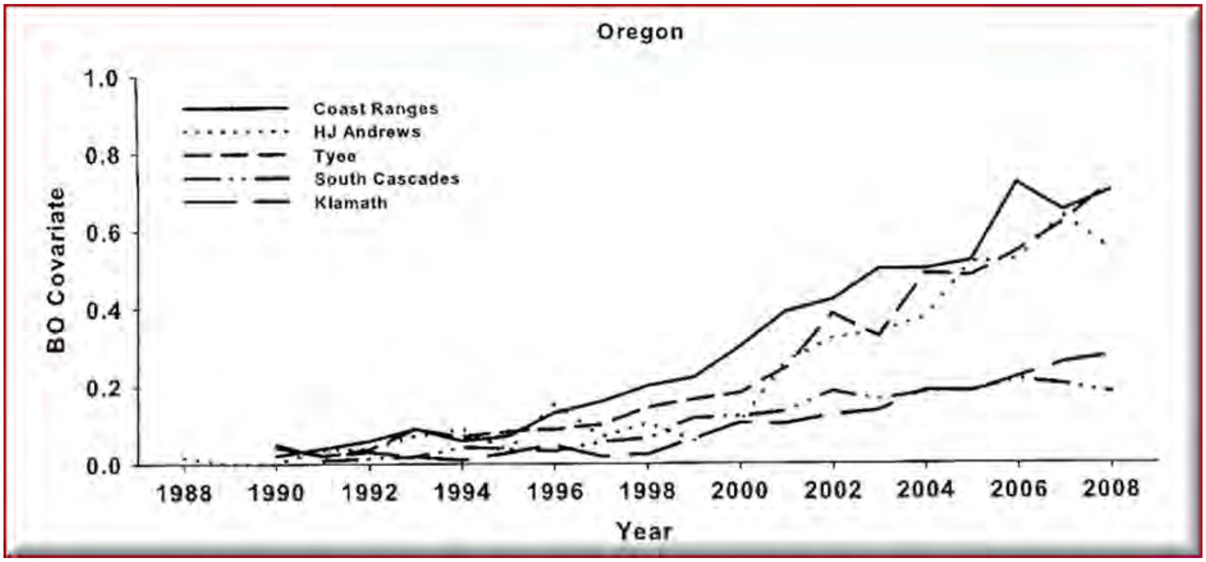

Figure 1. Annual proportion of Spotted Owl territories with Barred Owl detections (BO covariate) (Forsman, et al. 2011)

Does logging expand the range of barred owls?

The barred owl removal Draft Environmental Impact Statement (USFWS 2012c, pp. 43-44) specifically considered and rejected an alternative to use forest habitat management to favor spotted owls and hinder barred owls. They reasoned that there are no known forest conditions where spotted owls have a competitive advantage over barred owls. Pearson and Livezey (2003, p. 272) state that managing forests to benefit spotted owls over barred owls may not be possible because both species use the same type of old-growth habitat. Barred owls successfully colonized Olympic National Park in areas that never had timber harvest (Courtney et al 2004, pp. 7-13). Old growth reserves appear to be supporting large populations of barred owls, and in many cases there are more barred owls than spotted owls in the reserves (Pearson and Livezey 2003, p. 271). USFWS (2011, p. 1-8) assumes barred owls now occur at some level in all areas used now or in the past by spotted owls. We provide information above showing that barred owls are widely established in the action area. Therefore we conclude there is no scientific support that the silvicultural treatments assessed in this Supplemental BA will expand the range of barred owls.

Do silviculture treatments that thin, create early seral, or create edge habitat favor barred owls over spotted owls?

A detailed review for the spotted owl recovery plan found much evidence that barred owls prefer old-growth and older forest habitat, not early seral or edge habitat (USFWS 2011, pp. B-10-12). In portions of the spotted owl's range, barred owl populations are increasing while spotted owls are declining, to some degree independently of forest management history in the area (Courtney et al. 2004, pp. 7-37).

Wiens (2012, entire) conducted a thorough study of the interaction between barred and spotted owls in the moist temperate forests of western Oregon by radio tracking 29 spotted owls and 28 barred owls in 36 neighboring territories over a 2-year period. He found that both owl species had similar use of young, mid-seral, and mature forests and that both species avoided areas within 135 meters of forest/non-forest edges. Both species avoided open areas and young forests less than 60 years of age and used mature conifer forests (60-120 years of age) proportional to their availability within the landscape (second order selection). Wiens' study contains the most detailed information applicable to the action area, comparing the use of younger forest by the two species.

The available information does not provide support for the hypothesis that thinning young and mature forest or the creation of early seral habitat or forest edge selectively favors barred owls over spotted owls in the action area.

Does reducing the amount of older forests on the landscape increase competition between barred and spotted owls?

Information presented above indicates that both barred owls and spotted owls prefer older forest habitat. The Northern Spotted Owl Recovery Plan recognized this mutual preference stating "Because barred owls compete with spotted owls for habitat and resources for breeding, feeding, and sheltering, ongoing loss of habitat has the potential to intensify the competition by reducing the total amount of these resources available to the spotted owl and bring barred owls into closer proximity with the spotted owl. " (USFWS 2011, p. I-9). To reduce or minimize this threat, the Service developed Recovery Action 32 (USFWS 2011, p. III-67) which recommends conserving and restoring older, multi-layered forests across the range of the spotted owl.

In the 15 year meta-analysis of spotted owl populations, Forsman et al. (2011, p. 77) wrote:

"In view of the continued decline of spotted owls in most study areas, it would be wise to preserve as much high-quality habitat in late successional forests for spotted owls as possible. This recommendation is comparable to (Recovery Action 32) in the final recovery plan for spotted owls (USFWS 2011), but we believe a more inclusive definition of high-quality habitat is needed than the rather vague definition provided in the 2011 recovery plan. Much of the habitat occupied by NSOs and their prey does not fit the classical definition of 'old-growth' as defined by Franklin and Spies (1991), and a narrow definition of habitat based on (this) criteria would exclude many areas currently occupied by NSOs. Second, we believe more information on competitive interactions between spotted owls and barred owls is needed. A recent study by D. Wiens at Oregon State University …will provide some of this information for western Oregon, but similar information is needed for other parts of the range of spotted owls. "

The Wiens (2012, pp. 34, 49-53, 102) study found that spotted owls and barred owls both prefer conifer forests >120 years of age with dominant overstory trees >90 cm dbh. Use of such forests was 2-5 times greater than their availability. Loss of these old forests is likely to increase the competition between the two owl species for territorial space with negative impacts to spotted owls. Wiens (2012, p. 42) found a significant decline in survival of spotted owls as the percent of old conifer forest in the home range dropped below 35 percent. He recommended that conifer forests greater than 120 years of age be protected to avoid further increasing the competition pressure from barred owls.

The above study is applicable to our action area. We analyzed both any loss of conifer forests greater than 120 years of age, as well as any loss of habitat fitting the description of Recovery Action 32, when evaluating how the proposed actions may affect interspecific competition with barred owls.

Summary of Effects to Spotted Owls and their Territories due to Habitat Alteration and Barred Owls

There are also generalized effects to spotted owls, due to a combination of barred owls and habitat modification.

Some of the proposed activities would remove or degrade habitat conditions for both barred and spotted owls within the home range of known spotted owl sites. The likelihood of barred owls occurring within the home range of most spotted owl sites in the action area is high, including multiple barred owl pairs residing within a single spotted owl site.

As previously mentioned both species use mid-seral and older types of conifer forest and prefer older forests, especially for nesting. However, barred owls appear to use a wider range of forest types compared to spotted owls (Dugger et al. 2011, p. 2466; Wiens et al. 2014, p. 32). When manipulation of habitat (e.g., timber harvest) alters habitat conditions for both barred owls and spotted owls, the relative effect on barred owls may be lesser because they do not appear as dependent on older forests as spotted owls.

Some spotted owls appear to be able to successfully defend territories and reproduce when barred owls are present (Dugger et al. 2011, p. 2466; Wiens et al. 2014, pp. 26-29), but the mechanism that allows this is currently unknown and such behavior often does not occur. Also all 5 spotted owls that attempted to nest within 1.5 km of a barred owl nest failed during incubation (Wiens et al 2014, p. 29). As mentioned above, when barred owls are present, the effect of habitat modification on spotted owl pair survival (estimated as the probability of extinction of a single territory) may be exacerbated by 2-3 times (Dugger et al. 2011, pp. 2463, 2465). The relative effect of barred owls on site extinction probability increases as the proportion of older forest habitat at the core area scale decreases (Dugger et al. 2011, p. 2465). Barred owl effects on spotted owl survival and colonization appear to be substantial and additive to the effects of reduction and fragmentation of habitat in spotted owl home range areas. Habitat loss accompanied by spotted owl exclusion from other habitat due to barred owl competition, has a disproportionate increase in the effects to spotted owls compared to habitat loss alone.

While the effects described above vary in occurrence and intensity among individual spotted owl territories, overall they are relevant assumptions used to assess typical effects of habitat modification and barred owl competition.

4 Status of Spotted Owl Critical Habitat

On December 4, 2012, the final rule for critical habitat for spotted owls was published (USFWS 2012b), and became effective on January 3rd, 2013. The revised critical habitat currently includes approximately 9,577,969 acres in 11 units and 60 subunits in California, Oregon, and Washington.

The full Status of the spotted owl critical habitat is in Appendix E for the efficiency of producing this BO, as the status of the species and its critical habitat is produced by the Northern Spotted Owl Consultation Coordination Team and contains extensive references.

Although the following information is in the incorporated Status of the spotted owl and its critical habitat, we are including it here to highlight the current need of critical habitat to support the spotted owl population within the North Coast Province.

4.1 Conservation Role of Critical Habitat

The role of spotted owl critical habitat is:

- To ensure sufficient habitat to support stable, healthy populations of spotted owls across the range and within each of the 11 recovery units,
- To ensure distribution of spotted owl habitat across the range of habitat conditions used by the species, and
- Incorporate uncertainty, including potential effects of barred owls, climate change and wildfire-disturbance risk.

Critical habitat protections are also meant to work in concert with other recovery actions such as barred owl management (USFWS 2012b, p. 71879). Recovery actions include:

1. Conserve the older growth, high quality and occupied forest habitat as necessary to meet recovery goals. This includes conserving old growth trees and forests on Federal lands *wherever they are found* (emphasis added), and undertake appropriate restoration treatment in the threatened forest types.

2. Implement science-based, active vegetation management to restore forest health, especially in drier forests in the eastern and southern portions of the spotted owl's range. This includes managing NWFP forests as dynamic ecosystems that conserve all stages of forest development (e.g., old growth and early seral), and where tradeoffs between short-term and long-term risks are better balanced. The NWFP should be recognized as an integrated conservation strategy that contributes to all components of sustainability across Federal lands.

3. Encourage landscape-level planning and vegetation management that allow historical ecological processes, such as characteristic fire regimes and natural forest succession, to occur on these landscapes throughout the range of the spotted owl. This approach has the best chance of resulting in forests that are resilient to future changes that may arise due to climate change (USFWS 2012b, p. 71881).

4.2 Physical or Biological Features and Primary Constituent Elements

The designation of critical habitat for spotted owl uses the term primary constituent element. The new critical habitat regulations (USFWS and NOAA 2016: 81 FR 7214) replace this term with physical or biological features (PBFs). This shift in terminology does not change the approach used in conducting our analysis, whether the original designation identified primary constituent elements, physical or biological features, or essential features. In this consultation, the term PBF means primary constituent element as appropriate for the specific critical habitat.

The critical habitat rule identified the PBFs needed for the conservation of the spotted owl. The PBFs are the forested areas that are used or likely to be used by the spotted owl for nesting, roosting, foraging, or dispersing (USFWS 2012b, p. 71904). The PBFs are the specific characteristics that make habitat areas suitable for nesting, roosting, foraging, and dispersal (USFWS 2012b, pp. 71906-71908). The PBFs include:

1) forest types in early-, mid-, or late-seral stages; in concert with specific habitat that provides for:

2) nesting/roosting,

3) foraging, and

4) transience and colonization phases of dispersal.

Any activity occurring within critical habitat that impacts any of these PBFs may adversely affect spotted owl CH.

4.3 Analysis Scales

The consultation process evaluates how a proposed action is likely to affect the capability of the critical habitat to support the spotted owl by considering the action area and scales at which life-history requirements are based (USFWS 2012b, p. 71940). Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (USFWS and NOAA 2016, p 7216).

4.3.1 Action area

- The impact of the proposed action on the ability of the affected critical habitat to continue to support the life history functions supplied by the PBFs (e.i. territories that can support occupancy and landscapes that can support dispersing spotted owls).

4.3.2 Subunit

- The extent of the proposed action, both its temporal and spatial scale, relative to the critical habitat subunit within which it occurs.

- The specific purpose for which the affected subunit was identified and designated as critical habitat.
- The impact of the proposed action on the subunit's value for conservation of spotted owls.
- The overall consistency of the proposed action with the intent of the recovery plan or other landscape-level conservation plans.
- The special importance of project scale and context in evaluating the potential effects of timber harvest to spotted owl critical habitat.

4.3.3 Unit

- The extent of the proposed action, both its temporal and spatial scale, relative to the critical habitat unit within which it occurs.
- The aggregate effects of all completed activities in the critical habitat unit.
- The impact of the proposed action on the unit's value for conservation of spotted owls.

4.3.4 Range wide

- The extent of the proposed action, both its temporal and spatial scale, relative to the entire critical habitat network's value for the conservation of spotted owls.

5 Environmental Baseline – Spotted Owls

Except as supplemented and edited by the Service, the following environmental base line for spotted owls is from the BA (FS 2016, pp. 27-34).

5.1 Project Area

Spotted owl habitat occurs within the project area (Table 6 and Appendix A, Table A-7). One project is planned in the east cascades, affecting four acres of dispersal habitat and six acres of suitable habitat. The remaining 403.5 acres occur in the west cascades and include 20.5 acres of dispersal habitat, 31.5 acres of non-habitat, and 351.5 acres of suitable habitat (Appendix A, Table A-7).

Eight spotted owls sites are within the action area and within the project areas (Table 7 and Appendix A, Table A-15), all of which occur in the west Cascades. Three of the sites have core areas and/or home ranges that are below threshold levels for suitable habitat (Table 7). The other five sites have greater than 50 percent suitable habitat in the core areas and greater than 40 percent suitable habitat in the home ranges.

Table 6. Summary table of proposed projects broken out by Ranger district and spotted owl habitat type.

Admin Unit / Ranger District / Project Name / Activity type	Spotted owl habitat intersect: Dispersal	Non-habitat	Suitable	Total
Mt. Hood NF total:	**4**		**6**	**10**
Barlow RD total:	**4**		**6**	**10**
Dog River Pipeline	4		6	10
Road Construction	4		6	10
Willamette NF total:	**20.5**	**31.5**	**351.5**	**403.5**
McKenzie River RD total:	**20.5**	**31.5**	**347.5**	**399.5**
410 Rootrot Removal Pocket total:	0.5	4.5	1	6
Harvest Habitat Maintain		4.5		4.5
Harvest Habitat Remove	0.5		1	1.5
Fish Lake Thin and Danger Tree Removal total:		11	39	50
Harvest Habitat Downgrade			39	39
Harvest Habitat Maintain		11		11
Knoll Thin total:	12		55	67
Harvest Habitat Downgrade			55	55
Harvest Habitat Maintain	12			12
Lower 19 Road Hazardous Fuels				
Fuels Treatment	8	15	252	275
Tamolitch Pools Trailhead Improvement				
Harvest Habitat Remove		1	0.5	1.5
Middle Fork RD total:			**4**	**4**
Carpet Hill Quarry				
Harvest Habitat Remove			2	2
Deception Quarry				
Harvest Habitat Remove			2	2
Total	**24.5**	**31.5**	**357.5**	**413.5**

Table 7. Spotted owls sites that occur in the action area.

Ranger District	Known Site ID	Project Name	Core Area Post-treatment Suitable Acres (% suitable)	Home Range Post-treatment Suitable Acres (% suitable)	Summary of Effects to Spotted Owl Site
Middle Fork RD	2896	Carpet Hill Quarry	458 (91%)	2230 (77%)	Two acres of suitable habitat would be removed in the home range outside the core area. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	2825	410 Rootrot Pocket Removal	314 (62%)	1550 (54%)	One acre of suitable habitat would be removed in the home range outside the core area. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	835	410 Rootrot Pocket Removal	202 (40%)	905 (31%)	One acre of suitable habitat would be removed in the home range outside the core area. There would be no significant negative effect to the functionality of this site due to the small amount of habitat removed outside the core area.
McKenzie River RD	123	Fish Lake Thin and Danger Tree Removal Project	262 (52%)	705 (24%)	Three acres and 39 acres of suitable habitat would be downgraded in the core area and the home range, respectively. The downgrade is not expected to kill or injury any spotted owls because the site has not been occupied since 2009. It is expected that this site will continue to be surveyed as part of the HJA Demographic Study Area throughout the implementation of the project. If spotted owls are detected in this territory, consultation will be reinitiated.
McKenzie River RD	2449	Knoll Thin	389 (77%)	1825 (63%)	Fifty five acres of suitable habitat would be downgraded in the home range outside the core area. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	829	Knoll Thin	328 (65%)	1769 (61%)	Thirty seven acres and 55 acres of suitable habitat would be downgraded in the core area and the home range, respectively. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	822	Tamolitch Pools Trailhead Improvement	430 (85%)	2125 (73%)	One half acre of suitable habitat would be removed in the home range outside the core area. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	2838	Tamolitch Pools Trailhead Improvement	242 (48%)	1673 (58%)	One half acre of suitable habitat would be removed in the home range outside the core area. There would be no significant negative effect to the functionality of this site due to the small amount of habitat removed outside the core area.
All spotted owl sites are in the west Cascades, no project occurs within a nest patch, and there are no potential sites within the action area. Core areas and home ranges with suitable habitat below threshold levels are underlined and highlighted in bold.					

5.2 Spotted Owl Habitat on FS lands

Mountainous terrain, high precipitation and coniferous forests generally characterize the action area on the west side of the Cascades. On the east side, low precipitation provides a drier, colder climate and a shorter fire return interval with a corresponding difference in vegetation. The primary vegetation on the east side of the Cascades is ponderosa and lodgepole pine. Lodgepole pine is more susceptible to insects and disease and there are large areas of lodgepole, which have been killed by disease and insect infestations.

Projects on the west and east side of the Cascades are generally analyzed separately in these consultations, since ecological conditions differ significantly between the two areas.

Table 8 shows the status of spotted owl habitat and the estimated number of nest sites within the Mt. Hood and Willamette NFs. Nest sites are based on survey data from 1990 to 2016. There is an assumption that historic sites that have maintained their integrity have a high likelihood of continued occupancy based on unpublished data from the Tyee Northern Spotted Owl Demographic Study Area (Lint personal communication 2008 as cited in FS 2016, page 27).

5.3 Demographic Information

The Central Oregon Cascades Northern Spotted Owl Demography Project is located on the H. J. Andrews Forest (HJA), which is in the Willamette NF. Monitoring of spotted owl populations has occurred here since 1987 (Dugger et al. 2015, p. 63). Dugger et al. (2015 entire) describe the results of a long-term meta-analysis of spotted owl demography from 11 study areas across the range of the species. For the three areas in Washington (Cle Elum, Rainer, and Olympic), the upper 95 percent confidence intervals for population change were below 1.0, indicating declining populations in Washington. Of the five study areas in Oregon (Coast Ranges, HJ Andrews, Tyee, Klamath, and Southern Cascades), two of the areas (Coast Ranges and HJ Andrews) had declining populations as represented with upper confidence intervals below 1.0. The other three areas, located in southern Oregon (Tyee, Klamath and Southern Cascades) had potentially stationary population trends due to the upper confidence intervals overlapping 1.0. In northern California, two study areas (Northwest California and Hoopa) had declining populations whereas Green Diamond had a stationary population. Overall, spotted owl populations were declining on 7 of the 11 (more northerly) individual study areas. For the more southern portion of the species range (i.e., southern Oregon and northern California), spotted owl populations were either stable or the precision of the demographic estimates were not sufficient to detect declines.

For the meta-analysis (all 11 areas combined), the lambda estimate for the past 20 plus years of monitoring was 0.962 which represents a 3.8 percent average annual decline during the 20 plus year time period, and an increased rate of decline (3.8% vs. 2.9%) since the last meta-analysis was conducted in 2009. The rate of decline in the HJA demographic area was 3.5 percent per year, similar to the overall range-wide trend.

Another way to evaluate population trends is through realized population change estimates. This analysis compares the spotted owl population remaining at each study area in 2011 relative to the starting population (i.e., year of initial survey). For the individual study areas combined per state, Washington's realized population change showed a decline of 55 to 77 percent. For Oregon, the decline was 31 to 68 percent and for California the decline was 32 to 55 percent, excluding a treatment area where barred owls where removed. On the HJA demographic area, the decline was nearly 50 percent (Dugger et al. 2015, p. 72).

Substantial annual variation in fecundity was observed among study areas with support for declining trends in eight areas including HJA (Dugger et al 2015, p. 91). The top-ranked models in the meta-analysis of fecundity weakly supported that additive negative effects of the amount of suitable habitat in the "core" area, barred owl presence, and amount of edge habitat (Dugger et al 2015, pp. 58 and 83). Note that the meta-analysis definition of "core habitat" is more similar in size to the home range used in this BA analysis and not our BA definition of core area. Also the meta-analysis suggestion that fecundity should decrease with increasing suitable habitat is contrary to predictions. In the individual analysis of study areas, suitable habitat was positively related to the number of young fledged in 7 study areas (Dugger et al. 2015, pp. 81-82). However, in only four of these areas the covariate coefficients did not overlap zero, so there was little support for a strong relationship between habitat and fecundity in most areas, including HJA. Apparent annual survival was declining on 8 (CLE, RAI, HJA, TYE, CAS, NWC, HUP, GRD) of the 11 study areas (Dugger et al. 2015, p. 87). There was strong support for a negative effect of barred owls on apparent survival in 10 of 11 study areas (p. 58). Climate variables influenced survival in 10 of 11 study area with the range-wide meta-analysis suggesting that spotted owl survival is higher when the Pacific Decadal Oscillation is in a warming phase and the Southern Oscillation Index is negative. Few strong effects were found relative to habitat on survival.

Barred owl presence was strongly associated with spotted owl local extinction (i.e. an occupied territory not being occupied the following year) rates in all 11 study areas (p. 58). Habitat covariates were related to spotted owl extinction in 8 of 11 areas and greater amounts of suitable habitat were generally associated with decreased extinction rates.

The Dugger et al. 2015 demographic study was the first time that an occupancy analysis had been conducted across the range of the owl. The analysis suggests occupancy rates for spotted owls are declining on all study areas (Dugger et al. 2015, p. 74). In Washington, occupancy rates declined from 56-100 percent in 1995 to 11-26 percent in 2013. In Oregon rates declined from 61-88 percent in 1995 to 28-48 percent in 2013. (HJA had the highest occupancy rates declining from 88 percent to 48 percent during that time (p. 79). In California, rates declined from 75-92 percent to 38-55 percent during a comparable period. Barred owl presence had a strong negative effect on colonization rates for owl pairs in 5 of 11 study areas and the total amount of suitable habitat was positively associated with colonization rates in 5 study areas as well (p. 58). In summary Dugger et al. (2015, p. 96) found strong positive associations between habitat characteristics, especially increased amounts of nesting and roosting habitat and territory colonization rates by spotted owls across all study areas. They note that this finding has been reported previously (Sovern et al 2014, entire). They also found increased amounts of nesting and roosting habitat associated with decreased extinction rates in many areas similar to previous findings by Dugger et al. (2011 entire) and Sovern et al (2014, entire). Habitat relationships counterintuitive to past studies were detected on the GDR area in northern California, but spotted owls exhibit more use of younger stands and greater dependency on woodrats in that area compared to the Willamette Province. Dugger et al. (2015, p. 95-96) suggest that barred owls likely displace spotted owls from their territories and the adult spotted owls, unless they can find a new unoccupied territory, may survive for years as non-territorial "floaters" that do not contribute to population recruitment.

Most of the private land base is devoted to commercial timber production and now is on a 35-40 year harvest rotation. Some of the private land may become dispersal habitat for a short-time before the final harvest but, because we have no practical way to identify those acres, because any such dispersal habitat would last for only a few years before it is reharvested and becomes non-habitat, and because there is no reasonable certainty that this situation will change, we have just assumed the private land is all non-habitat. The project analysis therefore assumes that private lands are all non-habitat for spotted owls.

Table 8. Current status of the spotted owl and its habitat – Mt. Hood and Willamette NF

Mt. Hood and Willamette NF*	Total Acres	Protected[1]		Unprotected[2]		Non-agency lands within administrative unit boundaries[3]	
		Total Acres	% of Total	Total Acres	% of Total	Total Acres	% of Total
Acres within Boundary[4]	2,866,342	1,355,034	47%	1,511,309	53%	158,040	6%
Acres of Ownership[5]	2,708,302	1,355,034	50%	1,353,269	50%		
Suitable Habitat – Capable Acres[6]	2,360,435	1,139,619	48%	1,220,427	52%		
Suitable Habitat – Current Acres[7]	1,206,179	667,305	55%	538,875	44%		

Spotted Owl Sites	Number of Sites	Protected Sites	Protected % of Total	Unprotected Sites	Unprotected % of Total
Spotted Owl Sites[8]	915	602	66%	313	34%
Spotted Owl Sites with ≥ 50% suitable habitat in the core area	589	409	69%	180	31%
Spotted Owl Sites with ≥ 40% suitable habitat in the provincial home range	631	435	69%	196	31%
Spotted Owl Sites with ≥ 50% suitable habitat in the core area AND ≥ 40% suitable habitat in the provincial home range	532	375	70%	157	30%

1 Acres in this column are comprised of: Late Successional Reserves (LSR) and associated Riparian Reserves, 100-acre LSRs, and Congressional Reserves.

2 Acres in this column are comprised of: Matrix, Adaptive Management Areas, and Administratively Withdrawn Areas including associated Riparian Reserves. Administratively Withdrawn Areas are included in the unprotected column because technically these areas are not designed to provide spotted owl habitat but rather to serve some other function such as "recreation and visual areas, back country, and other areas where management emphasis precludes scheduled timber harvest" (USDA, USDI 1994a, p. A-4). The administrative land and resource management plan may protect and/or reduce the likelihood that spotted owl habitat located within Administratively Withdrawn Areas would be modified.

3 **Non-agency land is also listed in the Unprotected columns.**

4 Acres include both federal and non-federal lands within administrative boundaries (in this row only). These acres are derived from corporate GIS data, which were last updated in 2013. **Unprotected column includes all non-agency acres.**

5 Willamette Planning Province federal land only (for this and subsequent rows).

6 Federal land that is capable of producing suitable spotted owl habitat, regardless of its current habitat.

7 Suitable habitat is defined as nesting, roosting, foraging habitat.

8 Spotted owl sites represent pairs or resident singles 1990-2011 for Mt. Hood NF and 1990-2013 for Willamette NF. Location of site center is shown either in protected or unprotected Land Use Allocations.

Data was updated to reflect changes due to past harvest, land exchanges, GIS updates or new locations of spotted owl sites.

5.4 Status of FS Spotted Owls

Spotted owl habitat and population data for each of the administrative units that proposed projects are shown in Appendices B and C. These tables are similar to those presented for the

Mt. Hood and Willamette NFs in the fiscal year 1998 – 2016 habitat modification BAs for the Willamette Planning Province. Any changes in this baseline information are due to yearly updates of GIS forest type layers by the administrative units, land exchanges, and adjustments for past treatments and timber sales. Spotted owl activity center data are updated only when new locations are identified (1996 or later). However, there are also many activity centers that have not been surveyed since 1996 or earlier, and that may no longer be occupied by spotted owls.

Table 8 describes the status of the spotted owl and its habitat within the Mt. Hood and Willamette National Forests. Data are organized into protected and unprotected land allocations to demonstrate the ability of the Province to provide habitat for spotted owls.

Protected acres in Table 7 include the following land use allocation: LSRs and associated Riparian Reserves, 100-acre LSRs and Congressional Reserves (such as wilderness, Wild and Scenic Rivers, etc.). Unprotected acres in Table 7 include the following land use allocation: Matrix (including Connectivity), Adaptive Management Areas, and Administratively Withdrawn Areas as well as Riparian Reserves associated with these areas. Riparian Reserves are a protected land use allocations that were not mapped, but they will be identified and protected at the project level. As shown in Table 8, 55 percent of the total suitable acres in the Mt. Hood and Willamette NFs are protected. This also includes suitable habitat within Critical Habitat Units. In addition, 66 percent of the total spotted owl activity centers are located in protected land allocations. Current suitable habitat data are updated annually to account for past habitat removal, updated GIS databases and land exchanges. Spotted owl activity center data are updated as new locations are identified.

Table 9 narrows the scope of analysis to reflect the status of the spotted owl and its habitat within the LSRs in Mt. Hood and Willamette NFs. These data indicate that a majority of the LSRs have greater than 50 percent nesting, roosting, and foraging (suitable) habitat. Conditions of individual LSRs may depart from the average. For example, LSR RO203 is composed of only 34 percent suitable habitat. This information could be used to identify special management needs in those areas where LSRs are not functioning as intended. Analyses are based on the most recent data and are updated as new information or more accurate mapping becomes available and/or when land is acquired or exchanged.

Large blocks of spotted owl habitat are described Table 9 (LSRs) and Table 10 (LSRs and adjacent wilderness areas). Note that not all LSRs are associated with wilderness areas. Also, some LSRs and wildernesses align with more than one wilderness complex. Acres of some wildernesses were split between complexes to avoid duplication. This occurred primarily on the Mt. Hood NF.

Overall, the LSR/wilderness complexes provide greater than 60 percent suitable habitat, although two of the complexes have less than 50 percent suitable habitat (RO214/Mt. Jefferson Wilderness and Mt. Washington Wilderness). Both are high elevation wilderness areas. Analyses are based on the most recent data and are updated as new information or more accurate mapping becomes available and/or when land is acquired or exchanged.

Davis et al. (2016: entire) conducted the NWFP monitoring to show trends in spotted owl habitat over the first 20 years of implementation from 1994 to 2013. They found a net decrease of 1.5 percent in spotted owl nesting/roosting habitat on Federal lands from 9,089,700 acres in 1993 to 8,954,000 in 2013 (abstract summary not paginated). Gross losses on federal lands were 473,000 acres from wildfires (-5.2% loss), 116,100 acres from timber harvest (-1.3% loss), and 59,800 acres from insect and diseases (-0.7% loss). Because the gross losses were greater than the net losses, it indicates that the process of forest succession is compensating for some of the habitat loss.

Dispersal habitat increased by 2.2 percent on federal lands, but dispersal capable landscapes decreased by 5 percent due to habitat losses on the surrounding non-federal lands. Large wildfires continue to be the major loss of spotted owl habitat on federal lands and most of these losses occurred within the conservation network of large reserves designed for spotted owl conservation.

The 20-year monitoring sub-areas don't specifically match the Mt. Hood and Willamette NFs, but, within the Western Cascades, there was a net gain of 27,100 acres of spotted owl nesting/roosting habitat (1.5% increase) on Federal lands, despite gross losses of 101,500 acres (-4.3% loss) (Davis et al. 2016, p. 21). The losses include 34,900 acres dues to timber harvest, 63,000 acres due to wild fires, and minor losses due to insects and unspecified causes. Within the Western Cascades, there was a net gain of 122,200 acres of spotted owl dispersal habitat (3.4% increase) on Federal lands, despite gross losses of 121,500 acres (-3.7% loss) (Davis et al. 2016, p. 31). The losses of dispersal habitat include 28,300 acres due to timber harvest, 89,300 acres due to wild fires, and minor losses due to insects and unspecified causes. Recruitment of dispersal habitat on Federal lands in the Western Cascades is more than compensating for habitat losses with the recruitment rate about twice the rate of dispersal habitat loss.

The analysis of dispersal-capable landscapes found no loss of landscape connectivity in the interior of federal lands within the Western Cascades (Davis et al. 2016, Figure 9-p. 33). There has been no loss in landscape connectivity for spotted owls that exists along a wide corridor across the Cascade Range from the Canadian border south into northern California. However, substantial loss to dispersal capable areas has occurred along the south west area of the Willamette Province adjacent to the Willamette Valley and this loss extends south across a connection area between the Oregon Coast and Cascades Range south of the Willamette Valley. There also has been some areas of dispersal-capable landscape loss and a few small areas of gain along the eastern edge of the range of spotted owl in the east side Cascades area in the northern half of Oregon.

Table 9. Late-successional reserves and associated spotted owl habitat within the Mt. Hood and Willamette National Forests.

Late-Successional Reserves[1]	Total Acres	Capable Acres	Suitable Acres	% Suitable (of Capable)
RO201	76,261	74,330	40,388	54%
RO202	23,687	19,662	8,847	45%
RO203	3,049	2,947	1,006	34%

LATE-SUCCESSIONAL RESERVES[1]	TOTAL ACRES	CAPABLE ACRES	SUITABLE ACRES	% SUITABLE (OF CAPABLE)
RO204	21,549	18,679	9,757	52%
RO205	196	196	79	40%
RO206	342	342	110	32%
RO207	62,847	53,135	29,111	55%
RO208	1,955	1,800	1,262	70%
RO209	8,343	8,007	3,123	39%
RO210	8,718	8,502	5,053	59%
RO213	57,167	55,218	36,460	66%
RO214	40,015	38,013	19,815	52%
RO215	27,822	25,558	16,610	65%
RO216	604	602	461	77%
RO217	9,860	9,372	8,057	86%
RO218	26,241	24,626	17,076	69%
RO219	66,023	65,344	35,855	55%
RO220	51,391	48,559	29,881	62%
RO221	16,612	15,965	10,313	65%
RO222	92,840	90,272	56,602	63%
Total	595,522	561,129	329,866	59%

1 Data was updated in 2013 to reflect changes due to past harvest, land exchanges, Wilderness additions, and/or GIS updates. Where LSRs have become Wildernesses, only the acres that are not Wilderness are shown in this table. LSR/Wilderness Complexes are shown in the following table.

Table 10. Spotted owl suitable habitat in LSR/Wilderness complexes within the Mt. Hood and Willamette National Forests.

LSR / Wilderness Complex	Total Acres	Capable Acres	Suitable Acres	% Suitable (of Capable)
RO201 / Mark O. Hatfield Wilderness	116,284	79,253	56,403	71%
Mt. Hood Wilderness[1]	55,899	14,610	8,694	60%
RO202, 203, 204 / Badger Creek, Mt. Hood[1], Salmon-Huckleberry[1], Lower White River Wildernesses	89,991	57,414	41,237	72%
RO 205, 206, 2072, 208 / Salmon-Huckleberry[1], Roaring River, Clackamas[2] Wildernesses	171,087	121,149	87,095	72%
RO209, 210 / Bull of the Woods, Opal Creek Wildernesses	74,781	52,244	36,540	70%
RO214 / Mt. Jefferson Wilderness[3]	116,559	83,905	27,412	33%
RO213 / Middle Santiam Wilderness	65,866	63,535	44,505	70%

LSR / Wilderness Complex	Total Acres	Capable Acres	Suitable Acres	% Suitable (of Capable)
RO215 / Menagerie Wilderness	32,740	30,417	21,369	70%
Mt. Washington Wilderness	40,223	17,033	3,994	23%
RO218 / Three Sisters Wilderness	212,972	159,769	97,019	61%
RO220 / Waldo Lake Wilderness	85,540	79,409	55,338	70%
RO221 / Diamond Peak Wilderness	35,548	31,045	24,723	80%
Total	1,097,490	789,783	504,329	64%

[1] Only a part of this wilderness is in this complex. The rest is more closely aligned with another LSR/wilderness complex.

[2] A portion of RO207 is associated with Salmon-Huckleberry and Roaring River Wildernesses. The rest is adjacent to these with a long stringer attaching it to the Mt. Jefferson Wilderness. All of RO207 is reported in this complex. See Appendix B for a map of the Mt. Hood LSR/Wilderness Complexes.

[3] Includes both Mt. Hood and Willamette NF portions of Mt. Jefferson.

Data was updated in 2013 to reflect changes due to past harvest, land exchanges, Wilderness additions, and/or GIS updates.

5.5 Distribution of FS Protected Land Use Allocations

Protected land use allocations include LSR, 100-acre spotted owl activity center LSRs, and Congressional Reserves. Additionally, Riparian Reserves are a protected land use allocations, but they were not mapped. Although important for spotted owl conservation, these land use allocations do not contribute equally to the large clusters of spotted owls/habitat needed for spotted owl recovery. It is important to analyze data for the LSRs and adjacent wilderness areas that form the effective clusters of spotted owl populations.

Table 9 shows the amount of suitable habitat in the LSRs on the Mt. Hood and Willamette NFs. However, LSRs alone do not contain the entire protected meta-population clusters of spotted owls and habitat. Many of these LSRs are adjacent to wilderness areas, which increases the size of the cluster, the amount of current and future suitable habitat, and the number of current and future spotted owls. Thus the LSR/wilderness complexes are the true "effective" meta-population clusters that will directly contribute to spotted owl recovery. Suitable habitat in wilderness areas and associated LSR within the action area is shown in Table 10.

Although this analysis is not directly comparable to the analysis done in the BO of the NWFP (USFWS 1994, entire), it indicates that although some spotted owl sites located in LSRs and LSR/wilderness complexes might have home ranges that extend into unprotected land allocations, the large majority of these sites are likely to persist through time due to sufficient levels of protected suitable habitat within their home ranges.

6 Environmental Baseline – Spotted Owl Critical Habitat

Except as supplemented and edited by the Service, the following environmental base line for spotted owl critical habitat is from the BA (FS 2016, pp. 34-39).

6.1 Project Area

PBFs occur with the project areas (Table 11 and Appendix A, Table A-11) and in associated with other PBFs are supporting six spotted owl territories (Table 12 and Appendix A, Table A-15).

One project is planned to occur in the east cascades, affecting four acres of PBFs functioning as dispersal only habitat and 6 acres of PBFs functioning as suitable habitat in critical habitat subunit ECN-7. The remaining 403.5 of the proposed action acres occur in the west cascades and include PBFs functioning as dispersal only habitat (20.5 acres), non-habitat (31.5 acres), and suitable habitat (351.5 acres; Appendix A, Table A-7). Of these west cascades acres, 107.5 are in WCS-3 and 4 are in WCS-4 (Appendix A, Table A-11).

Eight spotted owls sites are within the project area (Appendix A, Table A-15), all in the west cascades. Five of the Activity Centers are in critical habitat subunit WCS-3, one is in critical habitat subunit WCS-4, and two are not in CH. Three of the sites have core areas and/or home ranges that are below threshold levels for suitable habitat (Appendix A, Table A-15). The other five sites have greater than 50 percent suitable habitat in the core areas and greater than 40 percent suitable habitat in the home ranges.

Table 11. Project and critical habitat sub-units intersect with PBFs.

Admin Unit / Ranger District / Project Name / Activity type — Acres by function of PBFs:	Dispersal only	Non-habitat	Suitable	Total
Mt. Hood NF	**4**		**6**	**10**
Barlow RD	**4**		**6**	**10**
ECN 7	4		6	10
Dog River Pipeline	**4**		**6**	**10**
Road Construction	4		6	10
Willamette NF	**12**	**1**	**98.5**	**111.5**
McKenzie River RD	**12**	**1**	**94.5**	**107.5**
WCS 3	12	1	94.5	107.5
Fish Lake Thin and Danger Tree Removal			**39**	**39**
Harvest Habitat Downgrade			39	39
Knoll Thin	**12**		**55**	**67**
Harvest Habitat Downgrade			55	55
Harvest Habitat Maintain	12			12
Tamolitch Pools Trailhead Improvement		**1**	**0.5**	**1.5**
Harvest Habitat Remove		1	0.5	1.5

(blank)				
Middle Fork RD			**4**	**4**
WCS 4			4	4
Carpet Hill Quarry			**2**	**2**
Harvest Habitat Remove			2	2
Deception Quarry			**2**	**2**
Harvest Habitat Remove			2	2
Total	**16**	**1**	**104.5**	**121.5**

Table 12. Spotted owl territories that occur in the action area and within CH

Ranger District & CH subunit (Activity Center)	Known Site ID	Project Name	Core Area Post-treatment Suitable Acres (% suitable)	Home Range Post-treatment Suitable Acres (% suitable)	Summary of Effects to Spotted Owl Territories
Middle Fork RD WCS4	2896	Carpet Hill Quarry	458 (91%)	2230 (77%)	Two acres of suitable habitat would be removed in the home range outside the core area. The functionality of the territory would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD WCS 3	123	Fish Lake Thin and Danger Tree Removal Project	262 (52%)	705 (24%)	Three acres and 39 acres of suitable habitat would be downgraded in the core area and the home range, respectively. The downgrade is not expected to kill or injury any spotted owls because the territory has not been occupied since 2009. It is expected that this territory will continue to be surveyed as part of the HJA Demographic Study Area throughout the implementation of the project. If spotted owls are detected in this territory, consultation will be reinitiated.
McKenzie River RD WCS 3	2449	Knoll Thin	389 (77%)	1825 (63%)	Fifty five acres of suitable habitat would be downgraded in the home range outside the core area. The functionality of the territory would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD WCS 3	829	Knoll Thin	328 (65%)	1769 (61%)	Thirty seven acres and 55 acres of suitable habitat would be downgraded in the core area and the home range, respectively. The functionality of the territory would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD WCS 3	822	Tamolitch Pools Trailhead Improveme nt	430 (85%)	2125 (73%)	One half acre of suitable habitat would be removed in the home range outside the core area. The functionality of the territory would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD WCS 3	2838	Tamolitch Pools Trailhead Improveme nt	242 (48%)	1673 (58%)	One half acre of suitable habitat would be removed in the home range outside the core area. There would be no significant negative effect to the functionality of this territory due to the small amount of habitat removed outside the core area.

6.2 Special Management Considerations

Special management considerations for PBFs are from the Final Critical Habitat Rule (USFWS 2012b, pp. 71909-71910). Following is a summary of the special management considerations considered in this document.

6.2.1 West Cascades/Coast Ranges of Oregon and Washington

Special management considerations or protection may be required in areas of moist forests to conserve or protect older stands that contain spotted owl sites or contain high-value spotted owl habitat. Silvicultural treatments are generally not needed to maintain existing old-growth forests on moist sites. In contrast to dry and mesic forests, short-term fire risk is generally lower in the moist forests that dominate on the west side of the Cascade Range, and occur east of the Cascades as a higher elevation band or as peninsulas or inclusions in mesic forests. Disturbance based management for forests and spotted owls in moist forest areas should be different from that applied in dry or mesic forests. Efforts to alter either fuel loading or potential fire behavior in these sites could have undesirable ecological consequences as well. Furthermore, commercial thinning has been shown to have negative consequences for spotted owls and their prey. Active management may be more appropriate in younger plantations that are not currently on a trajectory to develop old-growth structure. These stands typically do not provide high-quality spotted owl habitat, although they may occasionally be used for foraging and dispersal.

In general, to advance long-term spotted owl recovery and ecosystem restoration in moist forests in the face of climate change and past management practices, special management considerations or protections may be required that follow these principles as recommended in the 2011 Revised Recovery Plan (USFWS 2011, p. III–18):

1. Conserve older stands that have occupied or high-value spotted owl habitat as described in RA 10 (includes all territories, occupied or not), and RA 32 (older, high quality, and more structurally complex stands that support spotted owl recovery). On Federal lands, this recommendation applies to all land-use allocations.
2. Management emphasis needs to be placed on meeting spotted owl recovery goals and long-term ecosystem restoration and conservation. When there is a conflict between these goals, actions that would disturb or remove the essential PBFs of spotted owl critical habitat need to be minimized and reconciled with long-term ecosystem restoration goals.
3. Continue to manage for large, continuous blocks of late-successional forest.
4. In areas that are not currently late-seral forest or high-value habitat and where more traditional forest management might be conducted (e.g. Matrix), these activities should consider applying ecological forestry prescriptions.

These special management considerations or protections apply to Units 1, 2, 4, 5 and 6 of the revised critical habitat. In this document, all proposed projects occur in Unit 6.

6.2.2 East Cascades

Eight special management considerations or protections were identified for the East Cascades Critical Habitat Unit in the Final Critical Habitat Rule.

1. Conserve older stands that contain the conditions to support spotted owl occupancy or high-value spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands this recommendation applies to all land-use allocations (see also Thomas et al. 2006, pp. 284–285).
2. Emphasize vegetation management treatments outside of spotted owl territories or highly suitable habitat;
3. Design and implement restoration treatments at the landscape level;
4. Retain and restore key structural components, including large and old trees, large snags, and downed logs;
5. Retain and restore heterogeneity within stands;
6. Retain and restore heterogeneity among stands;
7. Manage roads to address fire risk; and
8. Consider vegetation management objectives when managing wildfires, where appropriate.

The special management considerations or protections identified here apply to Units 7 and 8 of the revised critical habitat.

6.3 Critical Habitat Units in the Willamette Planning Province Action Area

Special management considerations or protection are required in all subunits in the action area to address threats from current and past timber harvest and competition with barred owls (USFWS 2012b). Additional specific expectations for each subunit are summarized below. Acres of each habitat type on federal lands are shown in Table 7.

In this consultation, known projects are only proposed in subunits ECN 7, WCS 3, and WCS 4. However, the other units and subunits in the action area are included in the discussion below.

Table 13. Acres of spotted owl critical habitat by subunit and habitat type for subunits that occur on the Mt. Hood and Willamette National Forests[1].

Critical Habitat Subunit	Suitable Habitat	Dispersal Habitat	Non-habitat (but forest capable)
BLM Eugene District			
WCS-3	6,989	172	1,052
WCS-4	56	4	22
WCS-5	6	0	1
BLM Salem District			
WCS-1	44	1,871	5
WCS-2	1,920	2,048	647
WCS-3	8,533	3,615	2,520
Mt. Hood National Forest			
WCS-1	53,394	19,929	12,124
WCS-2	70,518	45,171	29,116
WCS-3	39	20	11
ENC-7	58,419	45,451	31,660
Columbia River Gorge National Scenic Area			
WCS-1	2,982	426	156
Willamette National Forest			
WCS-2	15	12	0
WCS-3	184,954	60,499	46,400
WCS-4	234,697	77,082	63,599
WCS-5	62	30	32
[1]Acres are shown for all subunits that overlap on the Forests and include the acres of the subunits that occur on BLM and on the Columbia River Gorge.			

6.3.1 Unit 6: West Cascades South

This unit contains 1,355,198 acres with six subunits. Either a portion or all of these six subunits fall within the action area. The unit is located on the west side of the Cascades, with a few small areas east of the Cascades in WCS 1.

6.3.1.1 Subunit WCS 1

Of the 92,586 acres of critical habitat, about 92 percent (85,447 acres) occur on the Mt. Hood NF. This subunit is located within Multnomah and Clackamas Counties on the west side of the

Cascades and in Hood River County on the east side of the Cascades. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between subunits and critical habitat units (USFWS 2012b, p. 71925).

6.3.1.2 Subunit WCS 2

Of the 150,105 acres of this subunit, about 96 percent (144,832 acres) occur on the Mt. Hood and Willamette NFs. This subunit is located primarily in Clackamas County with a small part in Marion County. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south connectivity between subunits.

6.3.1.3 Subunit WCS 3

Of the 319,736 acres in this subunit, about 91 percent (291,923 acres) occur on the Mt. Hood and Willamette NFs. This subunit is located in Marion, Linn and Lane counties. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south connectivity between subunits.

6.3.1.4 Subunit WCS 4

Of the 379,130 acres in this subunit, about 99 percent (375,378 acres) occur on the Willamette NF. Most of this subunit is located in Lane County, with a small portion in Douglas County. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south connectivity between subunits.

6.3.1.5 Subunit WCS 5

Of the 356,415 acres in this subunit, only 124 acres are located on the Willamette NF. Most of this subunit is located in Lane County, with a small portion in Douglas County. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between subunits and critical habitat units.

6.3.2 Unit 7: East Cascades North

6.3.2.1 Subunit ECN 7

Of the 139,983 acres in this subunit, approximately 135,530 (97%) are located on the Mt. Hood NF. This subunit is located in Wasco and Hood River Counties on the east side of the Cascades with a small portion in Clackamas County on the west side of the Cascades.

Special management considerations or protection are required in this subunit to address threats from current and past timber harvest, removal or modification of habitat by forest fires and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between subunits and critical habitat units. This unit is located almost entirely on the east side of the Cascades.

7 Effects of the Proposed Action: Spotted Owls

Except as supplemented and edited by the Service, the following effects of the proposed action for spotted owls and their critical habitat is from the BA (FS 2016, pp. 39-86).

According to the Endangered Species Act Consultation Handbook (USFWS and NMFS 1998, p. xvi), a "*may affect*" determination is required when a proposed action may pose any effects to listed species or designated Critical Habitat. When any adverse effects to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, a "*likely to adversely affect*" determination is appropriate. However, when effects to listed species are expected to be discountable, insignificant or entirely beneficial, "*is not likely to adversely affect*" is the appropriate conclusion. Insignificant effects relate to the size of the impact and should never reach the level where potential injury to owl sites would occur. Discountable effects, as described in the consultation handbook, are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaning-fully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

The proposed action may impact the spotted owl in a variety of ways, and at differing levels, depending on where and when a project occurs. The following analysis of potential effects addresses this species with respect to disruption effects, habitat effects by activity type, followed by a summary of habitat effects to potential territorial spotted owl and then to dispersing spotted owls.

7.1 Disturbance

About 404 acres of activities were evaluated as occurring within the disturbance distance of spotted owls in the west-side Cascades and 10 acres in the east-side Cascades. **All of the activities would be not likely to adversely affect (NLAA) as they are planned to occur outside disruption distance/time or have been determined by the BLM to have no effect on spotted owls.** Projects proposed by administrative units and their effects from disruption to spotted owls are displayed in Table 15.

<u>The locations of the projects proposed in this biological assessment are known.</u> A narrative for each known project is listed in the respective administrative unit's appendix (Appendix B and Appendix C).

Table 14. Determination of effect due to disturbance/disruption. Footnotes are on the next page.

Disturbance Source	No Effect[1] March 1 – Sept 30	Disturbance Distance[1]	Disruption Distance[1]		Direct Injury and/ or Mortality[1]
		Entire Breeding Period	Critical Breeding Period	Latter Breeding Period	
		NLAA March 1 – Sept 30	LAA – Harass March 1 – July 15	LAA – Harass July 16 – Sept 30	LAA – Injury March 1 – Sept 30
Aircraft, small fixed wing (e.g., Cessna 182, 185, etc.)	> 0.25 mile	111 yards to 0.25 mi	≤ 110 yards	NA	NA
Blasting	> 1 mile	0.25 mile to 1 mile	≤ 0.25 mile[2]	NA	≤ 100 yards (injury)[2]
Burning (prescribed fires, pile burning, underburning, etc.)	> 1 mile	0.25 mile to 1 mile	≤ 0.25 mile[3]	NA	NA
Chainsaw use (includes felling hazard/danger trees)	> 0.25 mile	66 yards to 0.25 mile	≤ 65 yards[4]	NA	NA
Heavy Equipment (e.g., road construction, road repair, bridge construction, culvert replacements, etc.)	> 0.25 mile	66 yards to 0.25 mile	≤ 65 yards[4]	NA	NA
Helicopter: Chinook 47d	> 0.5 mile	266 yards to 0.5 mile	≤ 265 yards[5]	≤ 100 yards[6] (hovering only)	NA
Helicopter: Boeing Vertol 107, Sikorsky S-64 (Sky Crane)	> 0.25 mile	151 yards to 0.25 mile	≤ 150 yards[7]	≤ 50 yards[6] (hovering only)	NA
Helicopter: K-Max, Bell 206 L4, Hughes 500)	> 0.25 mile	111 yards to 0.25 mi	≤ 110 yards[8]	≤ 50 yards[6] (hovering only)	NA
Light maintenance (e.g., road brushing and grading) at campgrounds, administrative facilities, and heavily used roads	> 0.25 mile	≤ 0.25 mile	NA[9]	NA	NA
Log hauling on heavily used roads (FS maintenance levels 3, 4 and 5)	> 0.25 mile	≤ 0.25 mile	NA[9]	NA	NA
Pile driving (steel H piles, pipe piles) Rock crushing and screening equipment	> 0.25 mile	120 yards to 0.25 mile	≤ 120 yards[10]	NA	≤ 5 yards (injury)[10]
Tree Climbing	> 66 yards	26 yards to 65 yards	≤ 25 yards[11]	NA	NA

Footnotes for Table 14	
NA = Not Applicable NLAA = "Not Likely to Adversely Affect LAA = "Likely to Adversely Affect ≥ "is greater than or equal to" ≤ "is less than or equal to"	
1	Distances are measured from occupied spotted owl nest tree or fledgling location. If these are not identified, distances are from the edge of nest patch (for both known and potential spotted owl sites.
2	Impulsive sound associated with blasts is highly variable and potentially injurious at close distances. We selected a 0.25-mile radius around blast sites as a disruption distance based on observed prairie falcon flush responses to blasting noise at distances of 0.3 – 0.6 miles from blast sites (Holthuijzen et al. 1990, p. 273). Exposure to peak sound levels that are >140 dBA are likely to cause injury in the form of hearing loss in birds (Dooling and Popper 2007, pp. 23-24). We have conservatively selected 100 yards as an injury threshold distance based on sound levels from experimental blasts reported by Holthuijzen et al. (1990, p. 272), which documented peak sound levels from small blasts at 138 – 146 dBA at a distance of 100 m (110 yards).
3	Based on recommendations presented in Smoke Effects to Northern Spotted Owls (USFWS 2008, p. 4).
4	Based on Delaney et al. (1999, p. 67) which indicates that spotted owl flush responses to above-ambient equipment sound levels and associated activities are most likely to occur at a distance of 65 yards (60 m) or less.
5.	Based on an estimated 92 dBA sound-contour (approximately 265 yards) from sound data for the Chinook 47d presented in Newman et al. (1984, Table D. 1).
6.	Rotor-wash from large helicopters is expected to be disruptive at any time during the nesting season due the potential for flying debris and shaking of trees located directly under a hovering helicopter. The hovering rotor-wash distance for the Chinook 47d is based on a 300-ft. radius rotor-wash zone for large helicopters hovering at < 500 above ground level (from WCB 2005, p. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-yard radius for all other helicopters based on the smaller rotor-span for all other ships.
7.	Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USFS 2008, chapters 5, 6).
8.	The estimated 92 dBA sound contours for these helicopters is less than 110 yards (e.g., K-MAX (100 feet) (USDA 2008, chapters 5, 6), and Bell 206 (85-89 dbA at 100 m)(Grubb et al. 2010, p. 1277).
9.	NA = Based on information presented in Tempel and Gutiérrez (2003, p. 700), Delaney et al. (1999, p. 69), and Kerns and Allwardt (1992, p. 9), we anticipate that spotted owls that select nest sites in close proximity to open roads either are undisturbed by or habituate to the normal range of sounds and activities associated with these roads.
10.	Impulsive sound associated with pile-driving is highly variable and potentially injurious at close distances. A review compiled by Dooling and Popper (2007, p. 25) indicates that birds exposed to multiple impulses (e.g., pile driving) of sound at 125 dBA or greater are likely to suffer hearing damage. We have conservatively chosen a distance threshold of 120 yards for impact pile-driving to avoid potential effects to hearing and to account for significant behavioral responses (e.g. flushing) from exposure to loud, impulsive sounds. Based on an average maximum sound level of 110 dBA at 50 ft. for pile-driving, exposure to injurious sound levels would only occur at extremely close distances (e.g., ≤ 5 yards).
11.	Based on Swarthout and Steidl (2001, p. 312) who found that 95 percent of flush responses by spotted owls due to the presence of hikers on trails occurred within a distance of 24 m.

Table 15. Projects proposed by administrative units and their effects from disruption to spotted owls.

Ranger District	Project Name	Proposed Activity	Acres	Land use allocation	Current Habitat	Habitat Functionality Change	Effect-Disruption*
Barlow RD	Dog River Pipeline	Road Construction	6	Late-successional Reserve (LSR)	Suitable	Habitat removed	NLAA
Barlow RD	Dog River Pipeline	Road Construction	4	LSR	Dispersal	Habitat removed	NLAA
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	21	Matrix	Suitable	Suitable downgraded to dispersal	NE
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	18	Admin withdrawn	Suitable	Suitable downgraded to dispersal	NE
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Maintain	11	Admin withdrawn	Non-habitat	Non-habitat	NE
McKenzie River RD	Knoll Thin	Harvest Habitat Maintain	12	Matrix	Dispersal	Habitat maintained	NLAA
McKenzie River RD	Knoll Thin	Harvest Habitat Downgrade	55	Matrix	Suitable	Suitable downgraded to dispersal	NLAA
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Remove	1	Matrix	Suitable	Habitat removed	NLAA
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Remove	0.5	Matrix	Dispersal	Habitat removed	NLAA
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Maintain	4.5	Matrix	Non-habitat	Non-habitat	NLAA
McKenzie River RD	Tamolitch Pools Trailhead Improvement	Harvest Habitat Remove	0.5	Congressionally withdrawn	Suitable	Habitat removed	NE
McKenzie	Tamolitch Pools	Harvest Habitat	1	Congressionally	Non-	Non-habitat	NE

Ranger District	Project Name	Proposed Activity	Acres	Land use allocation	Current Habitat	Habitat Functionality Change	Effect-Disruption*
River RD	Trailhead Improvement	Remove		withdrawn	habitat		
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	252	AMA	Suitable	Habitat maintained	NLAA
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	8	AMA	Dispersal	Habitat maintained	NLAA
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	15	AMA	Non-habitat	Non-habitat	NLAA
Middle Fork RD	Carpet Hill Quarry	Harvest Habitat Remove	2	Matrix	Suitable	Habitat removed	NLAA
Middle Fork RD	Deception Quarry	Harvest Habitat Remove	2	LSR	Suitable	Habitat removed	NLAA

* NLAA=Not Likely to Adversely Affect because the projects is outside disruption distance/time of spotted owl nest trees of nest patches.

NE=No Effect

Table 16. Rationale for Disturbance/Disruption Effects Determinations

Disturbance Type	Time Period	Effect	Rationale for Effects Determinations
Mechanical noise (other than large helicopters)	Mar 1 – Jul 15	LAA	Noise effects vary and may cause little to no significant disruption depending on site- and activity-specific factors and an individual's tolerance to noise. In the worst-case scenario, adults can move from noise, likely causing increased predation to young, missed feedings, or premature fledging, which could result in a reduce fitness or death of young. However, we anticipate noise from actions will only increase the likelihood of injury to young through potentially increased predation of abandoned young.
	Jul 15 – Sept 30	NLAA	Spotted owls are still developing flight and hunting skills and are heavily cared for by parents. However, most have fledged by this date and are believed to be able to move short distances to stay with the parents being displaced.
Helicopters	Mar 1 - Jul 15	LAA	Noise/rotor wash can significantly disrupt birds. The worst-case scenario is that adults can move from noise, causing increased predation to young, missed feedings, or premature fledging, which could result in a reduce fitness or death of young. However, we anticipate likely injury only when large helicopter noise is within close proximity of nests which may result in the flushing of adults and which may cause increased predation or premature fledging. Since hovering near spotted owl nests and historic nests/centers is limited, we do not anticipate mortality from rotor wash.
	Jul 16 – Sept 30	LAA	Spotted owls are still developing flight and hunting skills and are heavily cared for by parents. While most young have fledged, the greater noise may cause the parents to travel greater distances to avoid the noise, and therefore the young who are not as skilled flyers yet are potentially more susceptible to predation.
Smoke (prescribed burns)	Mar 1 - Jul 15	LAA	Controlled burns will occur in the understory and will not remove or reduce the function of habitat. Burns will be low-moderate intensity and are not likely to cause mortality. Smoke should mostly travel in one direction since burns are conducted when winds are fairly low and not highly variable. Assuming four nautical directions, there is a ¼ chance of smoke continuously flowing toward nests (likelihood decreases further from nest). The 0.25-

Disturbance Type	Time Period	Effect	Rationale for Effects Determinations
			mile buffer is for a worst-case scenario. USFWS does not anticipate direct mortality to spotted owls from smoke/fire, but injury to young is possible if adults temporarily move from area, leaving eggs or young exposed to predation.
	Jul 15 – Sept 30	NLAA	Spotted owls are still developing flight and hunting skills and are heavily cared for by parents. However, most have fledged by this date and are believed to be able to move short distances to stay with the parents being displaced.
On-ground human presence	Mar 1 – Sept 30	NLAA	Spotted owls have not shown any flushing from a nest due to human presence on the ground.
In-canopy human presence	Mar 1 - Jul 15	LAA	Spotted owls may flush from a nest due to human presence in the tree canopy (based on expert judgment of spotted owl biologists in USFWS 2003, p. 18).
	Jul 15 – Sept 30	NLAA	Most young are fledged and likely able to move from tree climbers.

7.2 Habitat Modification by Activity Type

Rationale for effects determinations to spotted owls from actions that remove, downgrade or maintain spotted owl habitat is displayed in Table 17. Summary of effects determinations to spotted owls from habitat modification performed in compliance with the proposed action is displayed in Table 18.

<u>The locations of the projects proposed in this biological assessment are known.</u> A narrative for each known project is listed in the respective administrative unit's appendix (Appendix B and Appendix C).

This narrative for this section has been combined with 8.2 Habitat Modification by Activity Type for critical habitat and starts on page 91. Summary of effects are displayed in Table 19. Projects proposed by administrative units and their effects from habitat modification to spotted owls are displayed in

Activity Type / Agency / Ranger District or Resource Area / Project Name	Habitat effected *with effect to spotted owls*: Dispersal *Not Likely to Adversely Affect*	Non-habitat *No Effect*	Suitable *Likely to Adversely Affect*	Grand Total
Fuels Treatment total:	**8**	**15**	**252**	**275**
Willamette NF				
McKenzie River RD				
Lower 19 Road Hazardous Fuels	8	15	252	275
Harvest Habitat Downgrade total:			**94**	**94**
Willamette NF				
McKenzie River RD				
Fish Lake Thin and Danger Tree Removal			39	39
Knoll Thin			55	55
Harvest Habitat Maintain total:	**12**	**15.5**		**27.5**
Willamette NF				
McKenzie River RD				
410 Rootrot Removal Pocket		4.5		4.5
Fish Lake Thin and Danger Tree Removal		11		11
Knoll Thin	12			12
Harvest Habitat Remove total:	**0.5**	**1**	**5.5**	**7**
Willamette NF				
McKenzie River RD				
410 Rootrot Removal Pocket	0.5		1	1.5
Tamolitch Pools Trailhead Improvement		1	0.5	1.5
Middle Fork RD				
Carpet Hill Quarry			2	2
Deception Quarry			2	2
Road Construction total:	**4**		**6**	**10**
Mt. Hood NF				
Barlow RD				
Dog River Pipeline	4		6	10
Grand Total	**24.5**	**31.5**	**357.5**	**413.5**

Table 20.

Activity Type Agency Ranger District or Resource Area Project Name	**Habitat effected** *with effect to spotted owls* **Dispersal** *Not Likely to Adversely Affect*	**Non-habitat** *No Effect*	**Suitable** *Likely to Adversely Affect*	**Grand Total**
Fuels Treatment total:	**8**	**15**	**252**	**275**
Willamette NF				
McKenzie River RD				
Lower 19 Road Hazardous Fuels	8	15	252	275
Harvest Habitat Downgrade total:			**94**	**94**
Willamette NF				
McKenzie River RD				
Fish Lake Thin and Danger Tree Removal			39	39
Knoll Thin			55	55
Harvest Habitat Maintain total:	**12**	**15.5**		**27.5**
Willamette NF				
McKenzie River RD				
410 Rootrot Removal Pocket		4.5		4.5
Fish Lake Thin and Danger Tree Removal		11		11
Knoll Thin	12			12
Harvest Habitat Remove total:	**0.5**	**1**	**5.5**	**7**
Willamette NF				
McKenzie River RD				
410 Rootrot Removal Pocket	0.5		1	1.5
Tamolitch Pools Trailhead Improvement		1	0.5	1.5
Middle Fork RD				
Carpet Hill Quarry			2	2
Deception Quarry			2	2
Road Construction total:	**4**		**6**	**10**
Mt. Hood NF				
Barlow RD				
Dog River Pipeline	4		6	10
Grand Total	**24.5**	**31.5**	**357.5**	**413.5**

Table 17. Rational for effects determinations to spotted owls from actions that remove, downgrade or maintain spotted owl habitat.

Action	Effect to NSO	Rationale for Effect Determination
Remove suitable habitat	MA-**LAA**[1]	Timber harvest that removes the structural and vegetative components of occupied suitable habitat at the stand level is likely to adversely affect the ability of the affected spotted owl(s) to forage, nest, or shelter. Even though some structural components such as snags, clumps of large trees and down wood will be retained to meet existing NWFP requirements, the overall effect will be to set back stand conditions. Set-back for spotted owl dispersal is estimated at 30-40 years and over 80 years before stand conditions again support spotted owl nesting, roosting and foraging. The removal of suitable spotted owl habitat may affect the success of spotted owls to raise young, because 1) if a nest tree is removed, the pair will not be able to produce young until a suitable replacement nest has been established, and 2) if foraging habitat is limited near a nest tree and more foraging habitat is removed the spotted owl pair may not be able to obtain enough food to successfully fledge their young.
Downgrade suitable habitat	MA-LAA[1]	Timber harvest that downgrades the structural and vegetative components of occupied suitable habitat at the stand level is likely to adversely affect the ability of the affected spotted owl(s) to breed, feed, or shelter. Although the affected stands will continue to function as dispersal habitat (since many trees will be retained), nesting structure will likely be reduced or eliminated in the area and the quality of foraging and roosting structures within the stand will be diminished. The stands will retain a 40 percent or greater canopy cover in addition to some structural components (snags, clumps of large trees, down wood) to meet existing NWFP requirements. Immediately after harvest, the success of spotted owls to raise young is likely to be adversely affected because 1) if a nest tree is removed, the pair will not be able to produce young until a suitable replacement nest has been established, and 2) if foraging habitat is limited near a nest tree, as more foraging habitat is removed, the spotted owl pair will not be able to obtain enough food to successfully fledge their young. However, after the initial impact of timber harvest downgrading suitable habitat, the shrub layer would regenerate sooner compared to areas where suitable habitat is removed. Over time the understory habitat conditions for prey would recover more rapidly in stands where suitable habitat is downgraded rather than removed.
Maintain suitable habitat	MA-NLAA[2]	Timber harvest or prescribed burning that maintains suitable habitat is not likely to have a measurable effect on the ability of spotted owls to breed, forage, or shelter since the stand will retain its ability to function for the breeding, foraging and roosting of resident spotted owls. These stands will retain a 60 percent or greater canopy cover in addition to some structural components (snags, clumps of large trees, down wood) to meet existing NWFP requirements. Additionally, the activity would not result in adverse effects to occupation or reproduction at the site scale.

Action	Effect to NSO	Rationale for Effect Determination
	MA-LAA[1]	Any timber harvest that maintains suitable habitat at the stand scale but occurs within a nest patch is likely to adversely affect the spotted owl due to its proximity to the nest tree. Also, thinning of suitable habitat in a core area, where habitat is maintained but suitable habitat will constitute less than 50% of the core area after treatment, may adversely affect the spotted owl if the amount of available habitat being treated covers a large portion of the area. Forage habitat would be suboptimal in these cases and any impact, even minor, may contribute to the inability of the spotted owl pair to support successful reproduction.
Remove or maintain dispersal habitat	MA-NLAA[2]	Any timber harvest that removes or maintains dispersal habitat at the stand scale but occurs outside of a nest patch is not likely to adversely affect the spotted owl due to its distance from the nest tree. Per Standard 4, page 10, sufficient post-activity habitat would remain for spotted owl dispersal, which should provide ample foraging opportunities for resident spotted owls.
	MA-LAA[1]	Any timber harvest that removes or maintains dispersal habitat at the stand scale but occurs within a nest patch is likely to adversely affect the spotted owl due to its proximity to the nest tree or when dispersal habitat is used for foraging by a territorial pair. Also removal of dispersal habitat in spotted owl home ranges that are below threshold levels of suitable habitat when the dispersal habitat is functioning as the "next best" habitat and supporting nesting and rearing of young.

[1] MA-LAA = May affect and is likely to adversely affect. [2] MA-NLAA = May affect, but is not likely to adversely affect.

Table 18. Summary of effects determinations[4] to spotted owls from habitat modification (not including associated disturbances) performed in compliance with the propose action.

<table>
<tr><th>Activity Type</th><th>Suitable Habitat</th><th>Dispersal</th></tr>
<tr><td>HARVEST – HABITAT REMOVED</td><td>MA-LAA since suitable habitat would be removed.</td><td>MA-LAA when it occurs in nest patch of a known or potential spotted owl site.

MA-LAA when, in the opinion of the unit biologist, habitat supports foraging and the loss would negatively affect the functionality of a PHR, including nest patch, or limit regional spotted owl movement and survival.

MA-NLAA when habitat loss would not negatively affect the functionality of a PHR, including nest patch, or limit regional spotted owl movement and survival.</td></tr>
<tr><td>HARVEST – HABITAT DOWNGRADE</td><td>MA-LAA since suitable habitat is downgraded to dispersal habitat.</td><td>Not Applicable</td></tr>
<tr><td>HARVEST – HABITAT MAINTAIN</td><td rowspan="5">MA-LAA when (1) suitable habitat is downgraded to dispersal or removed as a result of the treatment, (2) in the opinion of the unit biologist, treatment would negatively affect the functionality of a PHR, or (3) treatment occurs in the nest patch of a known or potential site.

MA-NLAA when treatment would not negatively affect the functionality of a PHR, including nest patch,</td><td rowspan="5">MA-LAA when treatment (1) occurs in a nest patch of a known or potential site, (2) habitat supports foraging and the treatment negatively affects the functionality of a PHR or (3) limits regional spotted owl movement and survival.

MA-NLAA when treatment would not negatively affect the functionality of a PHR, including nest patch, or limit regional spotted owl movement and survival.</td></tr>
<tr><td>FUELS TREATMENT</td></tr>
<tr><td>SPECIAL HABITAT RESTORATION</td></tr>
<tr><td>TERRESTRIAL HABITAT ENHANCEMENT</td></tr>
<tr><td>ROAD CONSTRUCTION</td></tr>
</table>

[4] MA-LAA (May Affect, Likely to Adversely Affect) MA-NLAA (May Affect, Not Likely to Adversely Affect)

Activity Type	Suitable Habitat	Dispersal
Down Salvage	**MA-LAA** when, in the opinion of the unit biologist, treatment would negatively affect the functionality of a PHR or occurs in the nest patch of a known or potential site. **MA-NLAA** when treatment would not negatively affect the functionality of a PHR, including nest patch.	**MA-LAA** when treatment occurs in the nest patch of a known or potential site. **MA-NLAA** when treatment would not negatively affect the functionality of a PHR, including nest patch, or limit regional spotted owl movement and survival.
Individual Tree Removal	**MA-LAA** when (1) a nest tree is removed or (2) nesting structure is removed when such structure is limited in the stand. **MA-NLAA** when nest trees and limited nesting structure are maintained.	**MA-NLAA** since nesting structure would not be removed.
See Section IV for effect determination explanations. Determinations apply to known and potential spotted owl sites even if the nesting status is unknown. PHR = Provincial Home Range		

Table 19. Summary of habitat effects to spotted owls broken out by activity.

Activity Type / Agency / Ranger District or Resource Area / Project Name	**Habitat effected** *with effect to spotted owls* **Dispersal** *Not Likely to Adversely Affect*	**Non-habitat** *No Effect*	**Suitable** *Likely to Adversely Affect*	**Grand Total**
Fuels Treatment total:	**8**	**15**	**252**	**275**
Willamette NF				
McKenzie River RD				
Lower 19 Road Hazardous Fuels	8	15	252	275
Harvest Habitat Downgrade total:			**94**	**94**
Willamette NF				
McKenzie River RD				
Fish Lake Thin and Danger Tree Removal			39	39
Knoll Thin			55	55
Harvest Habitat Maintain total:	**12**	**15.5**		**27.5**
Willamette NF				
McKenzie River RD				
410 Rootrot Removal Pocket		4.5		4.5
Fish Lake Thin and Danger Tree Removal		11		11
Knoll Thin	12			12
Harvest Habitat Remove total:	**0.5**	**1**	**5.5**	**7**
Willamette NF				
McKenzie River RD				
410 Rootrot Removal Pocket	0.5		1	1.5
Tamolitch Pools Trailhead Improvement		1	0.5	1.5
Middle Fork RD				
Carpet Hill Quarry			2	2
Deception Quarry			2	2
Road Construction total:	**4**		**6**	**10**
Mt. Hood NF				
Barlow RD				
Dog River Pipeline	4		6	10
Grand Total	**24.5**	**31.5**	**357.5**	**413.5**

Table 20. Projects proposed by administrative units and their effects from habitat modification to spotted owls.

Ranger District	Project Name	Proposed Activity	Acres	Land use allocation	Current Habitat	Habitat Functionality Change	Effect-Habitat Modification*
Barlow RD	Dog River Pipeline	Road Construction	6	Late-successional Reserve (LSR)	Suitable	Habitat removed	LAA
Barlow RD	Dog River Pipeline	Road Construction	4	LSR	Dispersal	Habitat removed	NLAA
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	21	Matrix	Suitable	Suitable downgraded to dispersal	LAA
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	18	Admin withdrawn	Suitable	Suitable downgraded to dispersal	LAA
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Maintain	11	Admin withdrawn	Non-habitat	Non-habitat	NE
McKenzie River RD	Knoll Thin	Harvest Habitat Maintain	12	Matrix	Dispersal	Habitat maintained	NLAA
McKenzie River RD	Knoll Thin	Harvest Habitat Downgrade	55	Matrix	Suitable	Suitable downgraded to dispersal	LAA
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Remove	1	Matrix	Suitable	Habitat removed	LAA
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Remove	0.5	Matrix	Dispersal	Habitat removed	NLAA
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Maintain	4.5	Matrix	Non-habitat	Non-habitat	NE
McKenzie	Tamolitch Pools	Harvest Habitat	0.5	Congressionally	Suitable	Habitat removed	LAA

Ranger District	Project Name	Proposed Activity	Acres	Land use allocation	Current Habitat	Habitat Functionality Change	Effect-Habitat Modification*
River RD	Trailhead Improvement	Remove		withdrawn			
McKenzie River RD	Tamolitch Pools Trailhead Improvement	Harvest Habitat Remove	1	Congressionally withdrawn	Non-habitat	Non-habitat	NE
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	252	AMA	Suitable	Habitat maintained	LAA
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	8	AMA	Dispersal	Habitat maintained	NLAA
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	15	AMA	Non-habitat	Non-habitat	NE
Middle Fork RD	Carpet Hill Quarry	Harvest Habitat Remove	2	Matrix	Suitable	Habitat removed	LAA
Middle Fork RD	Deception Quarry	Harvest Habitat Remove	2	LSR	Suitable	Habitat removed	LAA

* LAA= Likely to Adversely Affect; NLAA=Not Likely to Adversely Affect; NE=No Effect

7.3 Effects of Activities to Territorial Spotted Owls

The best available science was used to develop assumptions within a general analytical framework and determine the effects of proposed activities to known and potential sites. *Uncited effects determinations below are the conclusions by the Level 1 team applicable only to the effects of proposed activities within the Willamette Planning Province.* Unit biologists are responsible for, and have supplied, details on the rationale for effects determinations.

Adverse effects are due to removal of suitable habitat, disruption, and/or negative impacts to known or potential spotted owl nest patches. Adverse effects from spotted owl habitat removal are likely to result in injury by impacting spotted owl survival and/or reproduction by:

1. Reducing forage habitat below optimal levels,
2. Further reducing forage habitat that is currently below adequate levels,
3. Impacting the nest patch, such as removing suitable or dispersal habitat, this may cause injury to the spotted owl.

Adverse effects from disruption are likely to result in harassment by impacting spotted owl survival and/or reproduction if the disturbance occurs within the disruption distance within one or more breeding seasons. Although harassment of breeding spotted owls is of short duration, especially compared to growing suitable habitat, the resulting adverse effects from disruption are additional adverse impacts to a spotted owl site that may have longer term adverse effects due to habitat changes. Adult spotted owls are expected to continue to survive with reduced reproduction or move to a new territory. Moving and searching for a new territory will potentially expose the adults to greater predation risk than a territorial spotted owl pair. Predation on spotted owls has not been directly observed, but is suspected by northern goshawks (*Accipiter gentiles*), cooper's hawks (*Accipiter cooperi*), red-tailed hawks *(Buteo jamaicensis)*, great horned owls (*Bubo virginianus*), and barred owls (*Strix varia*) (Courtney et al. 2004, page 2-8).

Table A-16 in Appendix A summarizes the project effects to the eight known spotted owl sites evaluated in this consultation.

7.3.1.1 <u>Dog River Pipeline –No territorial spotted owls, in LSR</u>

This action will occur within the Eastside Cascades Physiographic Province for spotted owls, six acres suitable habitat, four acres dispersal, all in LSR RO202. (See Appendix A, Table A-10). The City of The Dalles has an existing Special Use Permit with the Mt. Hood NF that allows maintenance of the existing pipeline that is the water source for the city. The proposed action would replace the existing wooden pipeline with a 24-inch-diameter iron pipe. This new pipeline would parallel the alignment of the existing pipeline, which is approximately 3.4 miles long. The project area has been surveyed to protocol for five years and no territorial spotted owl would be affected by this project. The project area will continue to be surveyed for spotted owls during project implementation.

Within this consultation, five projects are proposed within the McKenzie River Ranger District. Four of these five projects may affect 7 known spotted owl sites. All projects occur in the Western Cascades Physiographic Province for spotted owls.

7.3.1.2 <u>410 Rootrot Pocket Removal – 2 Activity Centers in 100ac LSRs</u>

The McKenzie River Ranger District is proposing to remove all Douglas fir trees within a ~ 6 acre stand that is 120 years old and has been identified to have extensive root disease. Douglas fir is the primary overstory species with a minor component of hemlock present. There are approximately 80 trees per acre, with an average diameter of 25.9 inches. The overall effects of the project are LAA due to the removal of one acre of suitable owl habitat along the edges of the more open rootrot pocket in which trees have fallen, which is currently 4.5 acres of non-habitat and 0.5 acre of dispersal habitat. While the short-term effects of this treatment are detrimental to the currently existing suitable and dispersal owl habitat, longer term benefits are that this treatment may stop or slow the spread of the disease to surrounding dispersal and suitable habitat stands. Two spotted owl sites may be affected from this project.

7.3.1.2.1 MSNO 0835

The activity center for MSNO 0835 (RA 10 priority 2) is based on a 1990 day resident single location. An evening single was also located in 1991. No additional recent owl locations have been detected since then. While habitat levels surrounding this site are quite low, surveys have not been conducted in the entire home range as part of the HJA Demographic Study Area and thus, current occupancy is unknown.

Habitat levels for MSNO 0835 are currently below threshold levels within the 0.5 mile core area as well as within the 1.2 mile home range (Table A-15). One acre of suitable owl habitat would be removed in the home range outside of the core area. This would reduce the percent of suitable habitat in the home range from 31.30 percent to 31.26 percent. Because the project activities are outside the core area and only a very small amount of habitat would be removed, this project is expected to cause an insignificant reduction in the functionality of MSNO 0835 and not cause death or injury to any spotted owls that might occupy this site. Removal of the root rot pocket may prevent or slow spread of this disease to the surrounding forest stands and thus, in the longer term the treatment could possibly benefit owl habitat levels if the large, adjacent trees remain standing and healthy. Disturbance effect would be NLAA-outside disruption distance/time.

7.3.1.2.2 MSNO 2825

The area around MSNO 2825 (RA 10 priority 8) has been surveyed to protocol standards each year since the late 1980s as part of the HJA Demographic Study Area. The activity center of MSNO 2825 is based on a 1991 non-nesting pair location. Additional detections include a 1992, 1993, 1995, and 2001 evening single. The site has been unoccupied since 2001. One acre of suitable habitat would be removed in the home range outside of the core area. Suitable habitat after treatment from this project for this site would remain above thresholds so the project is not expected to affect the functionality of the home range. Disturbance effects would be NLAA-outside disruption distance/time if the activity center was occupied at the time of implementation.

7.3.1.3 Knoll Thin – 2 Activity Centers in Matrix and Congressionally Withdrawn

Knoll Thin is a mature stand between 80-120 years old and is judged to contain a mix of dispersal and suitable spotted owl habitat. Trees in the stand are 18-36" in diameter and are vigorously competing with neighboring trees for more space. Treatments would include 61 acres of commercial thinning, 6 acres of gaps, and 3 acres of skips. Thinning would primarily remove smaller, unhealthy trees and would be done with ground-based and skyline equipment. Because a minimum of a 40 percent canopy cover would be maintained, the stand would remain as dispersal habitat after treatment. With this level of canopy retention, it would be expected to again reach suitable habitat stand quality in about 15 years, and the overall stand structure is expected to improve, compared to no-treatment.

7.3.1.3.1 MSNO 2449

MSNO 2449 was last found nesting in 2007, although a non-nesting pair was found in 2009. In spite of annual protocol surveys by the Oregon Cooperative Wildlife Research Unit, there have not been any nesting pair detections since that time. Suitable habitat acres are above the threshold within the 0.5 mile core areas, 77 percent, and home range, 63 percent. The core area for MSNO 2449 was redrawn from a 0.5 mile-circle to show a more realistic habitat use pattern and to include more contiguous suitable habitat patches to the north that would more realistically serve as the core area if the site were occupied. That area is where there were several years of responses in the 1990s and early 2000s. The home range was kept the same as the 1.2-mile radius around the Activity Center.

The Knoll Thin project would downgrade 55 acres of suitable habitat to dispersal within the home range but would not affect the redrawn core area. Suitable habitat after treatment from this project for this site would decline from 65 percent to 63 percent suitable, well above the 40 percent threshold level for the home range. After treatment, the core area remains at 77 percent suitable habitat. The disturbance effect determination will be NLAA-outside disruption distance/time.

7.3.1.3.2 MSNO 0829

MSNO 0829 was last found nesting in 2012. The annual surveys for the HJA Demographic Study Area have not detected any spotted owls at this activity center since that time. The Knoll Thin project would downgrade 55 acres of suitable habitat to dispersal within the home range and downgrade 37 acres of suitable habitat to dispersal habitat in the core area. Suitable habitat would decline from 73 percent to 65 percent in the core area and from 63 percent to 61 percent in the home range after treatment well above threshold levels for functional home ranges. We expect this activity center to provide a similar conservation role for the spotted owl after the project as it does currently. Disturbance effect would be NLAA-outside disruption distance/time.

7.3.1.4 Fish Lake Thin and Danger Tree Removal – 1 Activity Center in Matrix

Part of this project would downgrade about 39 acres of suitable owl habitat with a post-treatment habitat type of dispersal. Overall effects of this project are judged to be LAA. The final overstory canopy in suitable spotted owl habitat after tree removal would be maintained at over 40 percent. Hazardous snags and trees near the Fish Lake Remount Depot buildings, access roads or other high use areas that pose a danger would be felled and removed.

7.3.1.4.1 MSNO 0123

The adjacent activity center MSNO 0123 been annually surveyed by the Oregon Cooperative Wildlife Research Unit as part of the spotted owl demography study since the early 1990s. Oregon Cooperative Wildlife Research Unit surveys are considered a reasonable alternatives to implementation of the protocol (USFWS 2012, page 5). This activity center is most recently based on a 2008 nesting pair location. A day resident single was found in 2009, and there have been no spotted owl detections since then. Thus, this site now meets the definition of "unoccupied. " Historically, there were many spotted owl detections in the area in the 1980s through 2009.

The project would downgrade 3 acres of suitable habitat in the core area and 39 acres of suitable habitat in the home range. Suitable habitat after treatment from this project for this site would remain above the recommended functional threshold for the core area (changing from 53% to 52% suitable) but not the home range. After treatment, the home range would have 24 percent suitable habitat, down from 26 percent before treatment. Therefore, the functionality of this home range is expected to be negatively impacted. Disturbance would have no effect.

There is a low potential for killed or injured spotted owls at this site from habitat removal because the site is currently unoccupied based on survey information. It is expected that this site will continue to be surveyed as part of the HJA Demographic Study Area throughout the implementation of this project. If spotted owls are detected in this territory, consultation will be reinitiated.

7.3.1.5 Tamolitch Pools Trailhead – 2 Activity Centers both in Matrix

The McKenzie River Ranger District is proposing to install an approximately 1.5 acre parking lot at the Tamolitch trailhead on the McKenzie River trail. Tamolitch Pools has quickly become one of the most popular recreation sites on the McKenzie River Ranger District. There is not enough parking to accommodate the existing use and visitors are parking wherever they can fit a vehicle, creating resource impacts. The parking lot location would be placed over an area where there was past blowdown and a salvage sale, thus it would include a ~1 acre area of non-habitat and an additional ½ acre area of suitable spotted owl habitat. The parking lot installation will prevent reestablishment of habitat, including late and old growth, characteristics in the future.

The proposed parking lot installment is located within the 1.2 mile home ranges of two spotted owl sites: MSNO 0822 and MSNO 2838. Both sites, as well as the area surrounding the proposed parking lot installment, have been annually surveyed by the Oregon Cooperative Wildlife Research Unit as part of the HJA Demographic Study Area since the late 1980s and are reasonable alternatives to implementation protocol surveys (USFWS 2012, page 5). The annual demographic surveys are expected to continue during project implementation.

The project location is outside the 0.5 mile core areas of both nearby owl activity centers. The ~0.5 acre project footprint of suitable habitat removed is small and effects are expected to be very minor and have an insignificant effect on the functionality of the owl territories. No death or injury to spotted owls using these territories is expected as a result of this project.

7.3.1.5.1 MSNO 0822

The last nesting pair at this site was found in 2010. In 2011, a day resident single was found about 0.2 miles to the northwest of the current activity center which is about 0.9 miles from the proposed parking lot. In 2015, an evening single was found about 0.4 miles northwest of the activity center which is about 1 mile northwest of the proposed parking lot location. This project would not appreciably change the percent of current suitable habitat levels at this site (only 0.5 acres of suitable habitat in the home range would be removed maintaining suitable habitat at 58%). Disturbance effect would be no effect, including both the construction and use of the parking lot.

7.3.1.5.2 MSNO 2838

MSNO 2838 had the last nesting pair found in 2004. More recent locations after 2004 include a 2006 evening single that was found about 0.2 miles north of the proposed parking lot. In 2005, an evening single was found about 0.3 miles southeast from the proposed parking lot. This project would not appreciably change the percent of the currently suitable habitat levels at this site (only 0.5 acres of suitable habitat in the home range would be removed maintaining suitable habitat at 73%). Disturbance effect would be no effect, including both the construction and use of the parking lot.

7.3.1.6 <u>Lower 19 Hazardous Fuels – No Activity Centers, Adaptive Management Area</u>

The project area has not been surveyed for spotted owls. An evaluation for potential owl sites by the Willamette NF found suitable owl habitat well below threshold and determined no potential territories are likely to be supported by stands within the project area (see Appendix C project narrative).

7.3.1.7 Two Projects: Carpet Hill and Deception Quarry – 1 Activity Center, Matrix

Within this consultation, two quarry expansions, each removing two acres of suitable habitat, are proposed on the Middle Fork RD. Both projects occur in the Western Cascades Physiographic Province for spotted owls. One quarry expansion would affect a historic spotted owl site. Spotted owl surveys have been conducted near both quarry expansion areas and have detected no spotted owls within 0.25 miles of the quarries which would preclude any death or injury from blasting or heavy equipment use at these quarry sites. Because of the large amount of suitable habitat in the larger area surrounding the quarry sites, removing two acres of suitable habitat would not alter the functionality of any potential sites that might exist outside a 0.25 buffer around the quarries because habitat levels would remain above recommended levels within any potential home range or core area. Additional discussion is provided in the project narratives in Appendix C.

MSNO 2896

The Carpet Hill Quarry project would expand an existing quarry into surrounding suitable habitat and may affect one historic site, MSNO 2896. This site has not been surveyed within the last ten years. Suitable habitat of this territory exceeds 91 percent within the ½ mile core area. No treatment would occur in the core area. Within the 1.2 mile home range, suitable habitat would be 77 percent after two acres of suitable habitat are removed to expand the quarry. Suitable habitat after treatment from this project for this site would remain above thresholds. Therefore, we anticipate this home range will be able to function nearly the same as it does currently.

Blasting would not occur between March 1 and July 15, so we expect disturbance would not cause adverse effects to spotted owls, because it would be outside the disruption time. Suitable habitat within 0.25 miles of the proposed project would be surveyed to protocol prior to project implementation. If a nest is found beyond 300 meters but within 0.25 miles, seasonal restrictions on blasting would be extended to September 30. If a nest is found at or within 300 meters of the quarry activities, then this project will be suspended until consultation is reinitiated. Quarry activities including rock crushing would not be allowed within 120 yards of a nest patch from March 1 - July 15.

7.4 Effects of Activities to Dispersing Spotted Owls

No projects are occurring in an area of landscape concern for spotted owl dispersal.

No projects are included in this consultation that would remove spotted owl habitat in areas where post-activity habitat conditions would create a barrier or strong filter to spotted owl movement and survival across the landscape, in the opinion of the unit wildlife biologist (Appendix B and Appendix C).

7.5 Combined Effects to Demographic Support at the Physiographic Province Scale

Because the proposed action does not impact the comprehensive function of occupied spotted owl territories or the ability of dispersing spotted owls to use the action area, the Physiographic Provinces are expected to continue to support spotted owls at a similar level as before treatments.

7.6 Combined Effects to Demographic Support at the Listed Range

Because no adverse effects are expected at the Physiographic Province scale to support the spotted owl needs for the reasons described above, the Listed Range is expected to continue to support spotted owls at a similar level as before treatments.

8 Effects of the Proposed Action: Spotted Owl Critical Habitat

8.1 Effects Determinations for Spotted Owl Critical Habitat

A ***"may affect, likely to adversely affect"*** determination for spotted owl critical habitat that triggers the need for completing an adverse modification analysis under formal consultation is warranted in cases where a proposed Federal action will:

1) Reduce the quantity or quality of existing spotted owl nesting, roosting, foraging, or dispersal habitat (PBFs 2, 3 and 4) to an extent that it would likely adversely affect the ability of that PBF to provide for breeding, feeding, or sheltering;
2) Result in the removal or degradation of a known spotted owl nest tree when that removal significantly reduces the ability of spotted owl critical habitat to support spotted owl nesting (PBF 2);
3) Prevent or appreciably slow the development of spotted owl PBFs that currently do not contain all of the essential features, but have the capability to do so in the future; or
4) Result in the removal or degradation of a spotted owl nest tree when that removal reduces the likelihood of spotted owls nesting within the stand.

Effects determinations for spotted owl critical habitat in Mt. Hood and the Willamette NFs are generally made at the stand scale. For example, negative effects to an individual tree within spotted owl critical habitat will not necessarily equate to a determination of likely to adversely affect if the impacts to spotted owls are not measureable at the stand scale. In such cases an adverse modification analysis would not be triggered as part of a formal consultation because those effects are not measureable at the stand, or any larger, scale.

The numbered actions above would adversely affect spotted owl critical habitat because they impact the ability of critical habitat to provide for the survival or recovery of the spotted owl at the stand or greater scale regardless of current occupancy status by a spotted owl.

Most modifications that are likely to adversely affect critical habitat are ones that set back stand development (i.e. regeneration harvest, or thinning that reduces the late successional conditions to such an extent that the stand no longer supports resident spotted owls) compared to no treatment.

A ***"may affect, not likely to adversely affect"*** determination for spotted owl critical habitat is warranted in cases where a proposed Federal action will:

1) Not reduce the quantity or quality of existing spotted owl nesting, roosting, foraging, or dispersal habitat (PBFs 2, 3 and 4) at the stand level to an extent that it would be likely to adversely affect the stand's ability to provide for breeding, feeding, sheltering, or dispersal of an individual spotted owl;
2) Not reduce the quality of existing spotted owl nesting, roosting, foraging or dispersal habitat (PBFs 2, 3 and 4) at the territory or landscape level to an extent that it would likely adversely affect the territory or landscape's ability to provide the PBF's of spotted owl critical habitat;
3) Not result in the removal or degradation of a spotted owl nest tree when that removal reduces the likelihood of spotted owls nesting within the stand; or
4) Not prevent or appreciably slow the development of spotted owl habitat at the stand scale in areas of critical habitat that currently do not contain all of the PBFs, but have the capability to do so in the future.

Such actions are not likely to adversely affect spotted owl critical habitat because forested stands will maintain their function to support spotted owls in a manner as before treatment at the stand scale and will not slow the development of future late succession conditions. Most modifications that are not likely to adversely affect critical habitat are designed to accelerate stand development (i.e. thinning in non-habitat or dispersal to promote late succession conditions), or enhance a component of the stand (i.e. snag creation). Additional modifications that are not likely to adversely affect critical habitat are spread out through the stand and do not affect the function of the PBFs, but may be completed for reasons other than development of late-successional conditions (i.e. danger trees, fish trees).

Table 14 shows the known projects proposed by administrative units and their effects to spotted owl critical habitat. In Section D, if an action affects critical habitat, it is noted under descriptions of the effects of individual activities by activity type.

In Appendix A, Summary Tables A-9, A-10, and A-11 further portray the activities and effects within critical habitat associated with the proposed action.

Effects determinations for Spotted Owl Critical Habitat are found in Table 21. Summary of effects determinations to spotted owl critical habitat from habitat modification performed in compliance with the proposed action are displayed in Table 22.

Table 21. Rationale for effects determinations to spotted owl critical habitat from actions that remove, downgrade or maintain spotted owl habitat.

Action	Effect to NSO	Rationale for Effect Determination
Remove suitable habitat	MA-**LAA**[1]	Timber harvest that removes the structural and vegetative components of suitable habitat at the stand level is likely to adversely affect the ability of spotted owl critical habitat to provide foraging (PBF 3), nesting, or sheltering (PBF 2). Even though some structural components such as snags, clumps of large trees and down wood will be retained to meet existing NWFP and RMP requirements, the overall effect will be to set back stand conditions thus delaying the further development of spotted owl habitat. Set-back for spotted owl dispersal (PBF 4) is estimated at 30-40 years and over 80 years before stand conditions again support spotted owl nesting, roosting (PBF 2) and foraging (PBF 3). The removal of suitable spotted owl habitat directly removes PBF 2, limits the diversity of PBF 1 and affects the success of spotted owls to raise young, thus reducing the ability of critical habitat to contribute to the survival and recovery of spotted owls.
Downgrade suitable habitat	MA-LAA[1]	Timber harvest that downgrades the structural and vegetative components of suitable habitat within critical habitat at the stand level is likely to adversely affect the PBF's thus reducing the ability of spotted owls to breed (PBF 2), feed (PBF 3), or shelter (PBF 2). Although the affected stands will continue to function as dispersal habitat (PBF 4)(since many trees will be retained), nesting (PBF 2) will likely be reduced or eliminated in the area and the quality of foraging (PBF 3) and roosting structures (PBF 2) within the stand will be diminished. These effects will begin immediately after harvest, reducing the success of spotted owls to raise young (PBF 2), and to forage (PBF 3), thus reducing the ability of spotted owl critical habitat to support survival and recovery of spotted owls. However, after the initial impact of timber harvest downgrading PBF 3, the stand, including understory components including the shrub layer would regenerate sooner than areas where suitable habitat is removed. Over time the understory habitat conditions for prey (PBF 3) would recover more rapidly in stands where suitable habitat is downgraded rather than removed.
Maintain suitable habitat	MA-NLAA[2]	Timber harvest or prescribed burning that maintains the PBF's of spotted owl critical habitat in suitable habitat is not likely to have a measurable effect on the ability of spotted owls to breed (PBF 2), forage (PBF 3), or shelter (PBF 2) since the stand will retain its ability to function for the breeding, foraging and roosting of resident spotted owls. These stands will retain a 60 percent or greater canopy cover in addition to some structural components (snags, clumps of large trees, down wood) to meet existing RMP or NWFP requirements, as applicable. Therefore spotted owl critical habitat will continue to function and support survival and recovery of spotted owls.
	MA-LAA[1]	Any timber harvest that maintains suitable habitat at the stand scale but occurs within a nest patch is likely to adversely affect the spotted owl critical habitat because the close proximity to the nest tree would reduce the function of PBF 2. Also, thinning of suitable habitat in a core area, where habitat is maintained but suitable habitat will constitute less than 50% of the core area after treatment, may adversely affect the spotted owl critical habitat by impairing its' ability to support potential spotted owl territories across the landscape. Forage habitat would be suboptimal in these cases and any impact, even minor to PBF 3, may contribute to the inability of the spotted owl critical habitat to function to support survival and recovery of spotted owls.
Remove or maintain dispersal habitat	MA-NLAA[2]	Any timber harvest that maintains dispersal habitat at the stand scale but occurs outside of a nest patch is not likely to adversely affect the spotted owl critical habitat because the PBF's will also be maintained. Per Standard 10, page 24, sufficient post-activity habitat would remain to support functions of PBF 3 and PBF 4. Also removal of dispersal

Action	Effect to NSO	Rationale for Effect Determination
		habitat in spotted owl critical habitat may be NLAA if the removal doesn't reduce the stands ability to function as dispersal (PBF 4) and does not appreciably delay the development of suitable habitat within CH.
	MA-LAA[1]	Any timber harvest that removes or maintains dispersal habitat at the stand scale but occurs within a nest patch is likely to adversely affect spotted owl critical habitat because it adversely affects the function of PBF 2 as the proximity to the nest tree is so close. Or when dispersal habitat is necessary as foraging habitat (PBF 3) in order to support a functional spotted owl territory. This scenario may occur when threshold levels of suitable habitat are below optimal levels and the dispersal habitat is functioning as the "next best" habitat and supporting nesting and rearing of young (PBF 2).
[1]	MA-LAA = May affect and is likely to adversely affect.	
[2]	MA-NLAA = May affect, but is not likely to adversely affect.	

Table 22. Summary of effects determinations[5] to spotted owl critical habitat from habitat modification performed in compliance with the proposed action.

<table>
<tr><th>Activity Type in CHU</th><th>Suitable Habitat</th><th>Dispersal</th></tr>
<tr><td>HARVEST – HABITAT REMOVED</td><td>MA-LAA since PBFs would be removed and stand functionality would be negatively altered.</td><td rowspan="7">MA-LAA if any of the following conditions exist:
Occurs in nest patch of a known or potential spotted owl site as these actions would alter PBF 2.
When, in the opinion of the unit biologist, PBFs would be altered, either directly or indirectly, and treatment would reduce the ability of the action area* to support spotted owl dispersal.
When, in the opinion of the unit biologist, PBFs would be altered, either directly or indirectly, and treatment would delay the ability of the stand to develop suitable habitat (compared to untreated), and the delay in developing suitable habitat will also delay the functionality of the landscape to support breeding spotted owls, irrelevant of occupancy status.
MA-NLAA when, in the opinion of the unit biologist, PBFs would be altered but direct and indirect effects to the functionality of the action area* and the change in function of the stand to develop suitable habitat in the future stand (compared to untreated), would be discountable, insignificant or entirely beneficial, regardless of spotted owl occupancy.

* Or other local landscape area, whichever is smaller.</td></tr>
<tr><td>HARVEST – HABITAT MAINTAIN</td><td rowspan="6">MA-LAA if any of the following conditions exist::
Occurs in nest patch of a known or potential spotted owl site.
When, in the opinion of the unit biologist, PBFs would be altered and treatment would negatively affect the functionality of the stand, either directly or indirectly, regardless of spotted owl occupancy.
MA-NLAA when, in the opinion of the unit biologist, PBFs would be altered but direct and indirect effects to the functionality of the stand would be discountable, insignificant or entirely beneficial, regardless of spotted owl occupancy.</td></tr>
<tr><td>FUELS TREATMENT</td></tr>
<tr><td>SPECIAL HABITAT RESTORATION</td></tr>
<tr><td>TERRESTRIAL HABITAT ENHANCEMENT</td></tr>
<tr><td>ROAD CONSTRUCTION</td></tr>
<tr><td>DOWN SALVAGE</td></tr>
<tr><td>HARVEST – HABITAT DOWNGRADE</td><td>MA-LAA since PBF 2 and 3 would be reduced or eliminated and stand functionality would be downgraded.</td><td>Not Applicable</td></tr>
</table>

[5] MA-LAA (May Affect, Likely to Adversely Affect) MA-NLAA (May Affect, Not Likely to Adversely Affect)

Activity Type in CHU	Suitable Habitat	Dispersal
INDIVIDUAL TREE REMOVAL	**MA-LAA** when nesting structure would be removed (PBF 2) and, in the opinion of the unit biologist, such structure is limited in the stand, regardless of spotted owl occupancy. **MA-NLAA** when, in the opinion of the unit biologist, a PBF would be altered but direct and indirect effects to the functionality of the stand would be discountable, insignificant or entirely beneficial, regardless of spotted owl occupancy.	**MA-NLAA** since PBFs would not be altered.
See Section IV for effect determination explanations. Nest patch determinations apply to both known and potential spotted owl sites even if the nesting status is unknown.		

8.2 Habitat Modification by Activity Type

This narrative for this section has been combined with effects to spotted owl. Each activity will discuss effects expected to the species and to critical habitat. The analysis of potential effects encompasses all actions associated with the proposed project.

Projects proposed by administrative units and their effects to spotted owls and its critical habitat Table 23. Additional information is provided in the spreadsheets and narratives for each project are listed in the respective administrative unit's appendix (Appendix B and Appendix C).

Table 23. Projects proposed by administrative units and their effects to spotted owls and its critical habitat. No project will adversely affect spotted owls from disruption.

Ranger District	Project Name	Proposed Activity	Acres	Land use allocation	Current Habitat	Habitat Functionality Change	Effect-Habitat Modification*	CHU Subunit	CHU acres	Effect CHU*
Barlow RD	Dog River Pipeline	Road Construction	6	Late-successional Reserve (LSR)	Suitable	Habitat removed	LAA	ECN 7	6	LAA
Barlow RD	Dog River Pipeline	Road Construction	4	LSR	Dispersal	Habitat removed	NLAA	ECN 7	4	LAA
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	21	Matrix	Suitable	Suitable downgraded to dispersal	LAA	WCS 3	21	LAA
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	18	Admin withdrawn	Suitable	Suitable downgraded to dispersal	LAA	WCS 3	18	LAA
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Maintain	11	Admin withdrawn	Non-habitat	Non-habitat	NE			
McKenzie River RD	Knoll Thin	Harvest Habitat Maintain	12	Matrix	Dispersal	Habitat maintained	NLAA	WCS 3	12	NLAA
McKenzie River RD	Knoll Thin	Harvest Habitat Downgrade	55	Matrix	Suitable	Suitable downgraded to dispersal	LAA	WCS 3	55	LAA
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Remove	1	Matrix	Suitable	Habitat removed	LAA			
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Remove	0.5	Matrix	Dispersal	Habitat removed	NLAA			
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Maintain	4.5	Matrix	Non-habitat	Non-habitat	NE			
McKenzie River RD	Tamolitch Pools Trailhead Improvement	Harvest Habitat Remove	0.5	Congressionally withdrawn	Suitable	Habitat removed	LAA	WCS 3		LAA
McKenzie River RD	Tamolitch Pools Trailhead Improvement	Harvest Habitat Remove	1	Congressionally withdrawn	Non-habitat	Non-habitat	NE	WCS 3		NLAA
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	252	AMA	Suitable	Habitat maintained	LAA			
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	8	AMA	Dispersal	Habitat maintained	NLAA			
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	15	AMA	Non-habitat	Non-habitat	NE			
Middle Fork RD	Carpet Hill Quarry	Harvest Habitat Remove	2	Matrix	Suitable	Habitat removed	LAA	WCS 4	2	LAA
Middle Fork RD	Deception Quarry	Harvest Habitat Remove	2	LSR	Suitable	Habitat removed	LAA	WCS 4	2	LAA

* LAA= Likely to Adversely Affect; NLAA=Not Likely to Adversely Affect; NE=No Effect

8.2.1 Harvest – Habitat Remove (HH Remove)

8.2.1.1 General Effects to spotted owls-HH Remove

Suitable habitat: Removal of suitable habitat could impact spotted owls by removing the structural components required by spotted owls to reproduce. Some structural components such as snags, clumps of large trees, and down wood would be retained to meet existing NWFP requirements. However, the overall effect to suitable spotted owl habitat is that it will be set back for 30-40 years before it provides stand conditions suitable for spotted owl dispersal and over 80 years before it once again functions as suitable spotted owl habitat. The removal of such habitat may affect the success of spotted owls to raise young for the following reasons:

1) If a nest tree is removed, the pair will not be able to produce young until a suitable replacement nest has been established or they find another nest tree in another location.

2) If foraging habitat is limited near a nest tree, and additional foraging habitat is removed, the spotted owl pair may be unable to obtain enough food to successfully fledge their young. This may cause the pair to relocate to a nest site with sufficient foraging to support nesting which may delay nesting or require excessive energy to relocate to a different location.

Therefore, this type of harvest ***may affect, and is likely to adversely affect*** spotted owls directly and indirectly since such removal may impair the breeding or forage opportunities for resident spotted owls.

Dispersal habitat: Removal of dispersal habitat generally ***may affect, but is not likely to adversely affect*** (direct and indirect) spotted owls because sufficient habitat would remain in the area (see standard #4) to facilitate spotted owl dispersal and treatment would occur outside of known and potential nest patches.

However, in some instances removal of dispersal habitat ***may affect, and is likely to adversely affect*** (direct and indirect), spotted owls because the activity occurs within a nest patch affecting territorial pairs or it would limit the ability of spotted owls to disperse across the landscape.

8.2.1.2 General Effects to Critical Habitat – HH Remove

Suitable habitat: Removal of suitable habitat could impact spotted owl critical habitat by removing the PBFs that support spotted owl reproduction and roosting while dispersing. Some structural components such as snags, clumps of large trees, and down wood would be retained to meet existing NWFP requirements. However, the overall effect to PBFs 2, 3 and 4 is that they will be set back for 30-40 years before they provide stand conditions suitable for spotted owl dispersal and set back for over 80 years before they once again provide conditions for breeding and sheltering.

The removal of such habitat directly removes PBF 2, limits the diversity of PBF 1, and affects the success of spotted owls to raise young, thus reducing the ability of critical habitat to contribute to the survival and recovery of spotted owls.

Therefore, this type of harvest ***may affect, and is likely to adversely affect*** (directly or indirectly) spotted owl critical habitat since such removal may impair the breeding or forage potential provided by the critical habitat.

Dispersal habitat: Removal of dispersal habitat could impact spotted owl critical habitat by delaying the development of suitable habitat at the stand level because dispersal habitat (PBF 4) develops over time into PBFs 2 and 3. However, thinning treatments in even-aged, dense stands of dispersal habitat may be beneficial to critical habitat in the long term by increasing structure in the stand.

This action ***may affect and is likely to adversely affect*** spotted owl critical habitat directly or indirectly where removal of dispersal would delay development of the stand into suitable habitat compared to no treatment. However, if there is sufficient suitable habitat available after treatments for any potential owl territories, then delaying the attainment of suitable habitat by removing dispersal ***may effect, but is not likely to adversely affect*** critical habitat.

Removal of dispersal habitat in a nest patch ***may affect and is likely to adversely affect*** spotted owl critical habitat directly and indirectly because such activity could impact the potential for supporting spotted owl reproduction.

If removal of dispersal habitat does not delay the development of the stand into suitable habitat compared to no treatment, this action ***may affect, but is not likely to adversely affect*** spotted owl critical habitat directly or indirectly.

Non-habitat: Removal of non-habitat as used in this document is the “permanent” removal of non-habitat that is capable of becoming owl habitat and developing PBFs 2, 3 and 4. The one project in this document with removal of non-habitat is one acre that would be removed to build a parking lot. The effect of this action would be that the habitat affected would not contribute future PBFs that could support dispersal, nesting and roosting. If this action affects the ability of a stand to support those functions in the future it ***may affect and is likely to adversely affect*** spotted owl critical habitat. If the area of non-habitat that is removed is small and would not contribute to future loss of PBFs measurable at a stand scale, the action ***may affect, but is not likely to adversely affect*** spotted owl critical habitat.

8.2.1.3 <u>Project Effects– HH Remove</u>

There are four projects that would have HH Remove activities, all in the west-side Cascades, affecting a total of 1 acre of non-habitat (for a parking lot), 0.5 acres of dispersal habitat, and 5.5 acres of suitable habitat (Appendix A, Table A- 2). Three of these projects (affecting 4.5 acres of suitable habitat and 1 acre of non-habitat) are in critical habitat.

8.2.1.3.1 410 Rootrot Removal Pocket

This project would remove one acre of suitable owl habitat and 0.5 acre of dispersal habitat along the edges of the more open rootrot pocket in which trees have fallen, which is currently non-habitat. Trees would also be removed in 4.5 acres of non-habitat. The effect determination is ***may affect and is likely to adversely affect*** spotted owls from general habitat modification. The project does not occur in CH.

This project would not affect late-successional reserves or critical habitat.

See the project narrative in Appendix C for more details.

8.2.1.3.2 Tamolitch Pools Trailhead Improvement

The McKenzie River RD is proposing to install an approximately 1.5 acre parking lot at the Tamolitch trailhead on the McKenzie River trail. Tamolitch Pools has quickly become one of the most popular recreation sites on the McKenzie River RD. There is not enough parking to accommodate the existing use and visitors are parking wherever they can fit a vehicle, creating resource impacts. The parking lot location would be placed over an area where there was past blowdown and a salvage sale, thus it would include a ~1 acre area of non-habitat and an additional ½ acre area of suitable spotted owl habitat. The parking lot installation will prevent reestablishment of habitat, including late and old growth, characteristics in the future.

About 0.5 acres of spotted owl habitat that currently provides PBFs and 1 acre that is capable of growing PBFs would be permanently lost. This permanent loss of habitat would hinder the functionality of the stand to support nesting, roosting, and foraging for spotted owls. The effect determination is ***may affect and is likely to adversely affect*** both spotted owls and its critical habitat from general habitat modification.

This project would not affect LSRs.

See the project narrative in Appendix C for more details.

8.2.1.3.3 Carpet Hill Quarry

This quarry is an existing pit approximately 2 acres in size. Suitable habitat is present around the periphery of the project area and would be removed to expand the quarry. Up to 2 acres of suitable habitat would be removed resulting in an opening around 4 acres in size. The suitable habitat being proposed for removal is likely used for foraging and lacks the size and structural characteristics necessary to provide quality nesting habitat.

Blasting would not occur between March 1 and July 15, so we expect disturbance would not cause adverse effects to spotted owls, because it would be outside the disruption time. Suitable habitat within 0.25 miles of the proposed project would be surveyed to protocol prior to project implementation. If a nest is found beyond 300 meters but within 0.25 miles, seasonal restrictions on blasting would be extended to September 30. If a nest is found at or within 300 meters of the quarry activities, then this project will be suspended until it is reinitiated. Quarry activities including rock crushing would not be allowed within 120 yards of a nest patch from March 1 - July 15.

Two acres of suitable habitat and critical habitat would be permanently lost and would no longer provide PBFs for spotted owl conservation and recovery.

The effect determination is ***may affect and is likely to adversely affect*** both spotted owls and its critical habitat from general habitat modification.

This project would affect late-successional reserves and critical habitat. See the project narrative in Appendix C for more details.

8.2.1.3.4 Deception Quarry

This quarry is located adjacent to a road within suitable spotted owl habitat. The center of the proposed quarry is currently a small opening with exposed rock surrounded by smaller diameter trees. Suitable habitat is present around the periphery of the project area and would be removed to expand the quarry. Up to 2 acres of suitable habitat would be permanently removed. The suitable habitat being proposed for removal is provides habitat for foraging but lacks the size and structural characteristics necessary to provide quality nesting habitat. PBFs 3 and 4 would be permanently lost on two acres and PBF 2 would not develop and the habitat would not be available to support the conservation and recovery of spotted owls.

A small patch of RA32 habitat with scattered legacy trees (estimated 300+ year old stand) is present on the southern edge of the project area. The project biologist would flag the boundary of the RA32 habitat prior to implementation to ensure that no legacy trees are removed.

Blasting would not occur between March 1 and July 15, so we expect disturbance would not cause adverse effects to spotted owls, because it would be outside the disruption time.

Suitable habitat within 0.25 miles of the proposed project would be surveyed to protocol prior to project implementation. If a nest is found beyond 300 meters but within 0.25 miles, seasonal restrictions on blasting would be extended to September 30. If a nest is found at or within 300 meters of the quarry activities, then this project will be suspended until it is reinitiated. Quarry activities including rock crushing would not be allowed within 120 yards of a nest patch from March 1 - July 15.

The effect would be ***may affect and is likely to adversely affect*** spotted owls and its critical habitat from general habitat modification.

This project would affect LSRs. The removal of habitat for a rock quarry would only proceed if it is consistent with the LSR Assessment or if it has Regional Ecosystem Office approval.

See the project narrative in Appendix C for more details.

8.2.2 Harvest – Habitat Downgrade (HH Downgrade)

8.2.2.1 General Effects

Harvest – Habitat Downgrade would modify spotted owl suitable habitat to the extent that it no longer serves the function of nesting, roosting and foraging. It may, however, continue to function as dispersal habitat. Although the affected stands will continue to function as dispersal habitat (since many trees will be retained), nesting structure will likely be reduced or eliminated in the treated area and the quality of foraging and roosting structures within the stand will be diminished. The stands will retain a 40 percent or greater canopy cover in addition to some structural components (snags, clumps of large trees, down wood) to meet existing NWFP requirements.

Immediately after harvest, the success of spotted owls to raise young is likely to be adversely affected because: 1) if a nest tree is removed, the pair will not be able to produce young until a suitable replacement nest has been established or will have to relocate to a new tree; and 2) if foraging habitat is limited near a nest tree, as more foraging habitat is removed, the spotted owl pair will not be able to obtain enough food to successfully fledge their young. However, after the initial impact of timber harvest downgrading suitable habitat, the shrub layer would regenerate sooner compared to areas where suitable habitat is removed. Over time the understory habitat conditions for prey would recover more rapidly in stands where suitable habitat is downgraded rather than removed.

Since this activity would remove suitable habitat by downgrading it to dispersal, Harvest – Habitat Downgrade ***may affect and is likely to adversely affect spotted owls*** directly and indirectly by impairing the breeding or forage opportunities of resident spotted owls.

8.2.2.2 General Effects to Critical Habitat – HH Downgrade

Timber harvest that downgrades the structural and vegetative components of suitable habitat within critical habitat at the stand level is likely to adversely affect the PBF's thus reducing the ability of spotted owls to breed (PBF 2), feed (PBF 3), or shelter (PBF 2). Although the affected stands will continue to function as dispersal habitat (PBF 4)(since many trees will be retained), nesting (PBF 2) will likely be reduced or eliminated in the area and the quality of foraging (PBF 3) and roosting structures (PBF 2) within the stand will be diminished.

These effects will begin immediately after harvest, reducing the success of spotted owls to raise young (PBF 2), and to forage (PBF 3), thus reducing the ability of spotted owl critical habitat to support survival and recovery of spotted owls. However, after the initial impact of timber harvest downgrading PBF 3, the stand, including understory components including the shrub layer would regenerate sooner than areas where suitable habitat is removed. Over time the understory habitat conditions for prey (PBF 3) would recover more rapidly in stands where suitable habitat is downgraded rather than removed. Since this activity would remove PBFs 2 and 3 by downgrading it to dispersal only habitat (PBF 4), HH Downgrade ***may affect and is likely to adversely affect*** spotted owl critical habitat either directly or indirectly by impairing the breeding or forage opportunities for resident spotted owls and reducing roosting opportunities for dispersing spotted owls.

8.2.2.3 <u>Project Effects – HH Downgrade</u>

There are two projects in the McKenzie River Ranger District that would have HH downgrade activities, affecting a total of 94 acres of suitable habitat (Appendix A, Table A-3). For the reasons stated above, the effect determination is ***may affect and is likely to adversely affect*** both spotted owls and its critical habitat from general habitat modification. These projects are in critical habitat.

8.2.2.3.1 Fish Lake Thin and Danger Tree Removal

The McKenzie River RD is proposing to treat ~50 acres located in three stands. The purpose of the treatments is to provide defensible space around a historic site (the Fish Lake Remount depot) to reduce wildfire risks and to remove danger trees near the historic structures. The stands vary from 21 acres (Stand #1), 18 acres (Stand #2), and 11 acres (Stand #3). The project consists of thinning in stands that have trees that average 60-120 years old and would remove smaller and unhealthy trees. The stands contain a cohort of larger trees that are greater than 180 years old and larger than 38" in dbh. In Stands 1 and 2 (suitable habitat), this older cohort averages 23 legacy trees/acre with a younger cohort of trees 16-28 inches in dbh that averages 155 trees/acre. In Stand 3, there are both older and younger trees, but the stand is open with less than 40 percent canopy cover (non-habitat). In addition, the project would remove individual danger trees around the Fish Lake buildings that are causing a maintenance or encroachment issue. Following thinning, treatment-created fuels or natural fuel accumulations would be reduced through various methods such as hand and machine piling, and pile burning to reduce the fire hazard. Stands 1 and 2 are in critical habitat, while Stand 3 (the stand in non-habitat) is not.

No existing down wood would be removed from the stands. Snags that are hazards to the Fish Lake structures would be felled. Those snags that do not pose a safety concern would be retained to support habitat for the spotted owl prey base as well as primary cavity excavators. If felling is required, most snags will be left on site as downed wood if they do not pose a fire risk due to a large accumulation of dead wood near structures. Existing large down woody material will be maintained for habitat diversity, and full tree lengths will be retained as much as possible. The amount of down wood left would meet or exceed Forest Plan standards and guidelines.

The project area has been regularly surveyed for spotted owls as part of the HJA Demographic Study Area since the early 1990s and has been unoccupied since 2009. The project is not in any historic nest patch but would temporarily remove 3 acres of suitable habitat in a historic core area reducing the percentage of suitable habitat from 53 percent to 52 percent. It would temporarily remove 39 acres of suitable habitat in a historic home range reducing the percentage of suitable habitat from 26 percent to 24 percent. The project is not expected to have any disturbance effect to nesting spotted owls because the site is unoccupied.

This project would not affect LSRs because it is in the matrix and administrative withdrawn land use allocations.

Thirty nine acres of suitable habitat and 39 acres of suitable critical habitat would be downgraded by timber harvest. The effects of downgrading suitable habitat and critical habitat would be similar to that described in the general effects discussion above. Tiering to that discussion, the effect determinations would be ***may affect and is likely to adversely affect*** for spotted owls and for spotted owl critical habitat.

See the project narrative in Appendix C for more details.

8.2.2.3.2 Knoll Thin

The McKenzie River Ranger District is proposing to thin approximately 67 acres in one stand that is approximately 80-120 years old. The purpose of the project is to increase stand health and vigor, accelerate development of structural complexity and provide wood products to the public. Fifty-five acres of this stand would be HH downgrade (suitable downgraded to dispersal). Twelve acres would be HH maintain (dispersal maintained). Trees in the stand are 18-36” in diameter and are vigorously competing with neighboring trees for more space. Treatments would include 61 acres of commercial thinning, 6 acres of gaps, and 3 acres of skips. Thinning would primarily remove smaller, unhealthy trees and would be done with ground-based and skyline equipment. Associated activities would consist of road maintenance that includes rocking, brushing, blading, and rock compaction. Temporary road construction would not exceed 0.5 miles and there would be no permanent road construction, reconstruction, or culvert replacement. The stand contains a stream to the north that is excluded from the treatment area. Downed wood levels, post-treatment, would meet Northwest Forest Plan standards and guidelines. Post-treatment, large (> 20” dbh) snags should be retained at a minimum of 3/acre within units in spotted owl core areas, and at a minimum of 2 per acre in units in suitable habitat outside of core areas. Down wood retention levels should be 3 and 2 trees/acre, respectively, post-treatment.

The 55 acres of suitable habitat are considered foraging habitat but considered poor quality nesting/roosting habitat. Without treatment, the project biologist estimated the stands would continue to slowly develop into higher quality suitable foraging habitat over the next 40 years and improve over more time. The 12 acres of dispersal habitat would develop into low quality suitable habitat in the next 20 years. With treatment, the suitable habitat would be downgraded to dispersal habitat and recover to suitable habitat after ~15 years, at which time the habitat quality would be improved due to accelerated development of the remaining trees which would get larger diameters, bigger crowns, and improved structural habitat diversity Beyond 15 years, the thinning should create more vegetation layers, larger sized trees, and greater canopy development compared to no-treatment which would benefit nesting and roosting habitat.

To assess the effects on owl dispersal in the area, the project wildlife biologist evaluated the amount of dispersal and suitable habitat (since both habitats provide for dispersal) within 0.5 miles of the treatment units. A landscape photo shows good north-south suitable and contiguous habitat corridors, as well as east-west corridors surrounding both units that would continue to provide dispersal habitat without adversely impacting owl dispersal at this localized scale. No breaks in any existing corridor of forested habitat are expected to occur as a result of the proposed Knoll Thin treatment. Sufficient dispersal habitat would be maintained to provide for the life-history needs for dispersal for any spotted owls using this area.

The project area has been regularly surveyed for owls as part of the HJA Demographic Study Area and two historic sites overlap the treatment areas. One of these, MSNO 2449, has been unoccupied since 2009; the other (MSNO 2838), has been unoccupied since 2012. No harvest activities would occur within any nest patches, but would occur in the core area and PHR of these sites. MSNO 2838 would remain well above threshold levels for suitable habitat, post-treatment, at 65 percent and 62 percent in the core area and PHR, respectively. MSNO 2449 would remain above threshold levels for suitable habitat in the PHR at 63 percent post-treatment, but the percent suitable habitat in the core area would decline from 51 percent to 48 percent. Because this site is currently unoccupied and because the loss of suitable habitat is temporary (about 15 years) and would be improved long-term by the treatment, the project is not expected to negatively affect nesting owls. See the subsequent section on Recovery Action 10 for more discussion of this issue.

The project is not expected to cause any disruption to owls.

All of the Knoll Thin occurs in CH. Fifty five acres of thinning would occur in suitable habitat that currently provides PBF 3 and 4 (feeding and dispersal) but has limited structural complexity to provide for breeding and shelter (PBF 2). Eleven acres of thinning would occur in dispersal habitat that currently provides PBF 4.

Without treatment, the project biologist estimated the units in suitable habitat would continue to slowly develop greater trunk and crown diameters and greater structural complexity that would improve the quality of PBF 3 over the next 40 years. The 12 acres in dispersal habitat would develop sufficient structural and vegetative components to provide PBF 3 in about 20 years. With treatment, the suitable habitat would lose sufficient overstory canopy and other structural components and would not provide PBF 3 for about 15 years. After 15 years the treated suitable habitat would recover and again support PBF 3 and the quality of PBF 3 would be improved compared to untreated stands due to increased tree diameters, crown radii, and crown ratios of individual trees. The treatments would not delay and could accelerate the development of structural and vegetative components that provide for PBF 2 (nesting/roosting habitat). Because the treatments are expected to increase diameter, crown radius, and crown ratio of individual trees, it is expected to improve the quality of PBF 2 in the long term and would be beneficial to PBF 2.

There would be no loss of PBF 4 at the stand level. Based on the analysis of owl dispersal habitat described above, sufficient critical habitat providing PBF 4 would exist post-treatment to provide for the life-history needs for dispersal for any spotted owls using this area.

With respect to the role of critical habitat to provide for the demographic needs of spotted owls, the downgrade of habitat would reduce one core area below threshold levels (from 51% suitable down to 48% suitable) for about 15 years. This action would occur in a spotted owl territory that has been unoccupied since 2009 and is expected to improve PBF 2, 3, and 4 long-term. Therefore the action has a long-term benefit to the demographic function of the critical habitat subunit.

This project would not affect LSRs.

Based on the above discussion because suitable habitat would be downgraded and PBFs 2 and 3 would temporarily be removed, the effect determinations would be ***may affect and is likely to adversely affect*** for spotted owls and for spotted owl critical habitat.

See the project narrative in Appendix C for more details.

8.2.3 Harvest – Habitat Maintain (HH Maintain)

8.2.3.1 General Effects

Harvest – Habitat Maintain activities are expected to maintain the current functionality of spotted owl habitat after treatment (i.e., current suitable habitat would remain suitable and current dispersal habitat would remain dispersal).

Suitable habitat: HH Maintain activities in suitable habitat generally ***may affect, but are not likely to adversely affect*** spotted owls because this activity would maintain the canopy cover of stands used for nesting, roosting, and foraging at 60 percent or higher. Stands would also retain a combination of snags, down woody debris, suitable nest trees, plus horizontal and vertical canopy depth and structure sufficient to continue to support prey species and spotted owl nesting and foraging quality similar to pretreatment levels.

However, in some instances, maintaining suitable habitat ***may affect and is likely to adversely affect*** (direct and indirect) spotted owls because the impacts of this activity may contribute to the inability of a spotted owl pair to successfully reproduce due to the juxtaposition of the treated stand and its surrounding forest landscape (e.g., commercial thinning in a nest patch where current spotted owl habitat would retain its functionality after treatment).

Dispersal habitat: HH Maintain activities in dispersal habitat generally ***may affect, but are not likely to adversely affect*** spotted owls because canopy cover would be maintained at 40 percent or higher. Stands would also retain a combination of snags, down logs, and live tree understory structure sufficient to support at least a minimal prey base, which would continue to facilitate spotted owl dispersal.

None of the following conditions occur in the proposed action, but they are listed here to provide a full disclosure of possible effects. Impacts to dispersal habitat ***may affect and is likely to adversely affect*** (direct and indirect) spotted owls if: dispersal habitat is limited in the area; or the activity occurs within a nest patch.

Non-habitat: Generally, treatments in non-habitat have ***no effect*** on spotted owls, since the stands are not currently used by spotted owls. However, thinning treatments designed to improve forest health in stands that are currently not spotted owl habitat may have indirect beneficial effects to the spotted owl because such treatments could accelerate the growth of forest conditions needed by the spotted owl. Such treatments may have a ***beneficial effect*** on spotted owl habitat in the long term.

8.2.3.2 General Effects to Critical Habitat – HH Maintain

Suitable Habitat: Harvest in suitable habitat would maintain the canopy cover of stands used for nesting, roosting and foraging (PBFs 2,and 3) at 60 percent or higher, would not remove potential nest trees (PBF 2) and would leave sufficient coarse woody debris, understory structure and snags to support nesting and prey (PBFs 2,and 3). Treatment in suitable habitat either would accelerate the development of multi-structured stands or, at a minimum, would not slow the trajectory of the stand to contribute to the recovery of the spotted owl. Therefore, this activity ***may affect, but is not likely to adversely affect*** (directly or indirectly) spotted owl critical habitat since the physical and biological features of nesting, roosting and foraging would be maintained at a stand scale and the stand would continue to function as suitable habitat after treatment.

This activity ***may affect and is likely to adversely affect*** critical habitat when treatments meaningfully reduce and/or delay or preclude development of PBFs within treated stands.

Dispersal Habitat: Harvest in dispersal habitat (PBF 4) would maintain a canopy cover of 40 percent or higher to allow spotted owl movement across the landscape (PBF 4) and would leave sufficient coarse woody debris and understory structure in the stand to support the prey base. Treatment in dispersal habitat either would accelerate the development of multi-structured stands or, at a minimum, would not slow the trajectory of the stand to contribute to the recovery of the spotted owl. Therefore, this activity ***may affect, but is not likely to adversely affect*** (directly or indirectly) critical habitat since the ability of this habitat to provide for spotted owl survival and recovery would not be reduced at the stand scale as habitat functionality would be maintained.

8.2.3.3 Project Effects – HH Maintain

Knoll Thin, Fish Lake Thin and Danger Tree Removal and 410 Rootrot Removal Pocket in the McKenzie River RD projects proposed HH maintain activities (12 acres in dispersal habitat, 11 acres and 4.5 acres in non-habitat, respectively). Only Knoll thin occurs within critical habitat. For the reasons stated above, the effect determination for these HH Maintained activities is ***may affect and is not likely to adversely affect*** both spotted owls and its critical habitat from general habitat modification.

8.2.4 Fuels Treatment

This activity pertains to fuels treatments not associated with another activity. Fuels treatments that are associated with other activities include post-harvest burning, which are discussed under the HH Maintain or HH Remove activity. Fuel treatments may also occur under Prescribed Burning, Special Habitat Restoration, or Terrestrial Habitat Enhancement activities.

8.2.4.1 General Effects

Fuels treatment may remove, downgrade, or maintain suitable habitat and/or remove or maintain dispersal habitat. This activity would reduce fuel loading around values at risk and/or communities in order to establish a defensible perimeter for public health and safety in the event of wildfires. Amount and intensity of treatment depends on site-specific conditions.

Fuels Treatment ***may affect and is likely to adversely affect*** spotted owls (directly and indirectly) when:

1. Suitable habitat is removed or downgraded to dispersal habitat,
2. Impacts of the activity contribute to the inability of a spotted owl pair to successfully reproduce due to the juxtaposition of the treated stand with its surrounding forest landscape (e.g., burning in a nest patch), or
3. This activity limits the ability of spotted owls to disperse across the landscape.

Where current spotted owl functionality is retained after treatment and no disruption occurs due to smoke or noise, this activity ***may affect, but is not likely to adversely affect*** spotted owls (directly and indirectly) since the functionality of the current habitat would be maintained (i.e., suitable habitat would remain suitable and dispersal habitat would remain dispersal after treatment).

Fuels treatments in non-habitat would have ***no effect*** on spotted owls due to habitat modification, since the stands are not currently spotted owl habitat.

8.2.4.2 General Effects to Critical Habitat – Fuels Treatment

Fuel treatments that maintains the PBF's of spotted owl critical habitat in suitable habitat are not likely to have a measurable effect on the ability of spotted owls to breed (PBF 2), forage (PBF 3), or shelter (PBF 2) since the stand will retain its ability to function for the breeding, foraging and roosting of resident spotted owls. These stands will retain a 60 percent or greater canopy cover in addition to some structural components (snags, clumps of large trees, down wood) to meet existing RMP or NWFP requirements, as applicable. Therefore the spotted owl critical habitat will continue to function and support survival and recovery of spotted owls and this activity ***may affect, but is not likely to adversely affect*** critical habitat directly or indirectly. Exceptions to this are fuel treatments that maintain PBFs 2 and 3 at the stand scale but occur within a nest patch because even small reductions in canopy cover and other structural and vegetative components that support breeding, feeding, and sheltering in close proximity to the nest tree would reduce the function of PBF 2. Such treatments in the nest patch ***may affect and are likely to adversely affect*** critical habitat directly and/or indirectly because it would alter the PBFs in a way that diminishes the value of critical habitat for the conservation of a spotted owls. Also, fuel treatments in suitable habitat in a core area, where PBFs 2 and 3 are maintained but suitable habitat will constitute less than 50 percent of the core area after treatment, may adversely affect the spotted owl critical habitat by impairing its' ability to support potential spotted owl territories across the landscape. Forage habitat would be suboptimal in these cases and any impact, even minor to PBF 3, may contribute to the inability of the spotted owl critical habitat to function to support survival and recovery of spotted owls.

Any fuel treatment that maintains dispersal habitat at the stand scale but occurs outside of a nest patch is not likely to adversely affect the spotted owl critical habitat because the PBF's will also be maintained, provided sufficient post-activity habitat would remain to support functions of PBF 3 and PBF 4 (as per General Standard 4). Also, removal of dispersal habitat in spotted owl critical habitat may be NLAA if the removal doesn't reduce the stand's ability to function as dispersal (PBF 4) and does not appreciably delay the development of suitable habitat within CH.

Where suitable habitat is removed in critical habitat to provide a fuel break, this action ***may affect and is likely to adversely affect*** (directly or indirectly) critical habitat in the short term by removing suitable habitat. However, construction of a fuel break may benefit the overall stand in the long term by providing a defensible area for firefighters should a wildfire occur in the stand.

Fuel treatments in non-habitat in critical habitat have **no effect** on critical habitat when they do not change the development of future PBFs 2, 3, or 4 in the stand. If the fuel treatment appreciably delays development of structural and vegetative components that support dispersal (PBF 4), breeding (PBF2), feeding (PBF 3) and/or sheltering (PBF 2), then the action ***may affect and is likely to adversely affect*** CH. If the fuel treatment accelerates the development of the PBFs or results in improved future quality to the PBFs, then the action ***may affect, but is not likely to adversely affect*** critical habitat indirectly.

8.2.4.3 Project Effects – Fuels Treatment

There is one project in the McKenzie River Ranger District that would have Fuels Treatment. This would affect a total of 252 acres of suitable habitat, 8 acres of dispersal habitat, and 15 acres of non-habitat (Appendix A, Table A- 5).

8.2.4.3.1 Lower 19 Road Hazardous Fuels Treatment

Fire and Fuels Management is proposing a hazardous fuels reduction and scotch broom weed treatment in the 19 Road/410 Road area. The treatment would cover about 275 acres. The fuel treatment would reduce hazardous fuels by thinning understory ladder fuels and therefore limiting the potential of high-severity canopy-driven wildfires. Removing Scotch broom would limit spread of this invasive weed and promote growth of native vegetation ground cover. In addition, the area receives a large amount of illegal campers since it is connected by bus to Eugene/Springfield and opening the understory would potentially help law enforcement detect illegal campers, reduce the impacts to natural resources in the area from vagrant campers, and reduce the risk of campers starting uncontrollable fires.

The Road 19 area has been heavily used by forest visitors for long-term dispersed camping. Although there is a Forest Order set in place for no overnight camping outside of designated campgrounds, the public continues to camp here illegally, often leaving abandoned campfires and polluting the banks of McKenzie River with garbage and human waste. McKenzie River Fire Management has responded to multiple human-caused fires (i.e. Red King and South Fork Fires) in this area over the last ten years. Thinning the understory would aid in suppression and reduce severity of these human caused wildfires. Scotch broom has invaded several spots within the project area due to disturbance.

The project would use up to three types of treatments: cut/lop and scatter/underburn, cut/pile/burn and cut/pile/burn/underburn. The treatments would be based on fuel loading, environmental factors (i.e. riparian areas, spotted owl habitat) and other restrictions including cultural significance. A detailed description of the fuel treatment prescription is given in the project narrative in Appendix C. In general terms, trees up to 10” dbh (depending on species) would be thinned and danger trees would be felled and left as woody material on site. A minimum of two slash piles/acre would be created and left for wildlife.

Underburning may kill some individual overstory trees, however this is not expected to substantially alter the overstory canopy cover nor spotted owl habitat type. A seasonal operating restriction from March 1-July 15 would be applied to suitable spottedowl habitat with potential nesting habitat structure and within disruption distance. This habitat will be mapped upon field review and may include all suitable spotted owl habitat. The seasonal restriction may be waived if protocol spotted owl surveys are conducted and the area is determined to be unoccupied or owls are non-nesting in the year of operation. There are no historic or likely potential nest sites in the project area due to the low amounts of suitable habitat present.

Areas protected from treatments include, but are not limited to: any area identified in the Cougar Creek/South Fork McKenzie River Watershed Action Plan as needing protection; areas within 60' from Class 1 and 2 streams; areas within 30' from Class 3 and 4 streams; and any sensitive botanical, heritage or wildlife resource identified during project planning and implementation.

The treatments in suitable habitat would greatly reduce the understory cover that provides habitat for spotted owl prey species such as wood rats and snowshoe hares. Overstory cover would only be minimally affected and sufficient cover would be maintained to support red tree voles and flying squirrels, provide spotted owl roosting sites, and provide cover and foraging for dispersal. These actions would degrade the foraging habitat in the stands but would not completely eliminate the function of spotted owl suitable and dispersal habitat (e. g. suitable habitat would still be classified as suitable habitat post-treatment). Removing small diameter trees under 10" dbh would also affect future stand structure. Over the time of stand development, without treatment, some of these smaller trees would eventually contribute to the canopy, and others would become snags of various sizes and later down wood on the forest floor. This would provide valuable habitat for the spotted owl prey base over time. The effects of a single fuels reduction treatment as proposed would be somewhat limited. If these treatments are later regularly repeated over many decades, effects would increase because those areas of the stands that are treated would eventually show little to no understory and midstory development because most of the smaller understory trees would be removed. Any such future actions would have to be consulted on before implementation and is not part of this proposed action.

Up to 190 acres of the Lower 19 Road's 252 acres of suitable habitat proposed units may contain RA32 habitat. The general effect to RA 32 habitat is similar to that described for suitable habitat (i.e. a loss of understory structure that provides habitat for spotted owl prey). Effects of this fuels treatments in the potential 190 acres relating to RA 32 habitat is described in greater detail in the RA 32 section.

The project is not in LSRs or in CH.

Because the project would measurably degrade the foraging component of the suitable habitat at the stand level and does not occur in critical habitat, the effect determinations would be ***may affect and is likely to adversely affect*** for spotted owls and **No effect** for spotted owl critical habitat.

8.2.5 Road Construction

8.2.5.1 General Effects

Road construction is generally expected to maintain suitable and/or dispersal habitat at the stand level. Some limited suitable and/or dispersal may be removed and/or suitable habitat may be downgraded.

Suitable habitat: Small impacts, generally less than one acre, from road construction ***may affect, but is not likely to adversely affect*** spotted owls since the functionality of suitable habitat at the stand level to provide nesting, roosting and forage for spotted owls would be maintained. However, openings larger than one acre in size where suitable habitat is removed ***may affect and is likely to adversely affect*** spotted owls directly and indirectly because it would remove suitable habitat.

Dispersal habitat: Road construction that removes dispersal habitat, where (in the opinion of the unit biologist) dispersal habitat would not be limiting in the area after treatment ***may affect, but is not likely to adversely*** affect spotted owls due to habitat modification.

In some instances, road construction ***may affect, and is likely to adversely affect*** spotted owls directly and indirectly if:

1. A non-discountable amount of suitable habitat is removed,
2. Suitable habitat is downgraded to dispersal habitat,
3. Impacts of the activity may contribute to the inability of a spotted owl pair to successfully reproduce due to the juxtaposition of the treated stand with its surrounding forest landscape (e.g., burning in a nest patch), and/or
4. If this activity limits the ability of spotted owls to disperse across the landscape.

8.2.5.2 <u>General Effect on Critical Habitat – Road Construction</u>

Small impacts, generally less than one acre, from road construction ***may affect, but are not likely to adversely affect*** spotted owl critical habitat since the PBFs that provide nesting, roosting, foraging, or dispersal for spotted owls at the stand level would be maintained.

Removal of suitable habitat greater than one acre for road construction in some cases ***may affect and is likely to adversely affect*** spotted owl critical habitat by permanently removing physical and biological features within the road prism and constructing a road. Despite permanent habitat removal, in most instances this action would not alter the habitat function of the surrounding stand.

8.2.5.3 <u>Project Effects – Road Construction</u>

The Dog River Pipeline project is in this category as it is a long liner right of way project, but it is not a road. It will create a 25 foot wide and 3.4 miles long clearing to accommodate a new water pipeline totaling about 6 acres suitable habitat and 4 acres dispersal habitat.

8.2.5.3.1 Dog River Pipeline

This project occurs within the Eastside Cascades, LSR RO202 (entire project) and ECN 7 critical habitat subunit (see Appendix A, Table A-10). The City of The Dalles has an existing Special Use Permit with the Mt. Hood NF that allows them to maintain a pipeline that is the water source for the City. The proposed action would replace the existing wooden pipeline with a 24-inch-diameter iron pipe. This new pipeline would parallel the alignment of the existing pipeline which is approximately 3.4 miles long. Existing trees and dead wood would be cut and removed within the 25-foot right of way (10.3 acres over the 3.4 mile long pipeline). The largest five percent of these trees will be felled and left on site to provide large down wood. See the project narrative in Appendix B for more details.

The pipeline has been surveyed for spotted owls every year since 2012. This is year 5 of surveys to protocol and no spotted owls have been detected during these surveys. A seasonal restriction for cutting trees will be imposed from March 1 to July 15. The District wildlife biologist has inspected all trees to be cut and none of these trees currently provide nesting opportunities in the form of cavities or mistletoe brooms.

Suitable habitat and critical habitat habitat that provides PBFs 2, 3, and 4 would be permanently removed along the 25-foot corridor. All of the project is in LSR. The activity will reduce the amount of large trees and small snags on the landscape. The LSR characteristics at the stand scale would remain almost the same because the tree removal is within a long narrow corridor and the stand will continue to support large areas of LSR at similar levels as before treatment. Also the project is identified in the Surveyor's Ridge LSR Assessment as a project that would be implemented within the LSR. A small portion (approx. 0.5 miles) of the project is in RA 32 habitat. This project will not change the function of this habitat.

Because the pipeline would permanently remove 6 acres of suitable habitat and 4 acres of dispersal habitat and would permanently eliminate any potential for the 10 acres of critical habitat to contribute to spotted owl conservation and recovery, the effect determinations would be ***may affect and is likely to adversely affect*** for spotted owls and for spotted owl critical habitat.

8.2.6 Sub-activities that occur with above activities

The following treatments were considered as part of the above actions and are not stand-alone actions.

8.2.6.1 <u>Post Harvest Burning</u>

Treatment of harvest-generated fuels can include grapple piling, hand piling and under burning. The loss of large woody debris would be minimized by prescribing broadcast and underburning during the spring or under "spring-like" conditions. Conditions are generally considered "spring-like" when the 1,000 hour fuels (> 3 inches in diameter) have fuel moistures of 25 percent or greater. Soil and duff moistures are damp, limiting duff consumption. Mortality of overstory trees would be low.

Prescribed burning prescriptions would ensure that coarse woody debris would be maintained after treatment in accordance with the Northwest Forest Plan and Forest Land Use Plans. Therefore, the prey base dependent on large woody debris is likely to continue to occupy the units even though there density maybe impacted by the prescribed burning. It is unlikely that nesting structure would be lost from prescribed burns conducted under "spring-like" conditions since moisture content of woody material is high and only the smaller diameter fuels burn readily. In addition, ground cover would come back within a season favoring native species.

Pile burning is most often conducted during the rainy season and piles are not located under nest trees. Standards for coarse woody debris would be maintained. Therefore, the addition of post-harvest burning to the activities listed above would have discountable additional habitat modification beyond what is described under the appropriate activity above. Therefore, post-harvest burning would have ***no significant additional effect*** to spotted owls or to spotted owl critical habitat from habitat modifications.

8.2.6.2 Firewood cutting

Firewood cutting may occur at the landings of units or along roads, but no additional habitat within the treatment unit would be modified, other than that described under the appropriate activity above. Therefore, firewood cutting would have ***no significant additional effect*** to spotted owls or to spotted owl critical habitat from habitat modifications.

8.3 Effects of Activities to PBFs providing for the life history needs of Territorial Spotted Owls

Of the proposed projects, Dog River Pipeline, Knoll Thin, Fish Lake Thin and Danger Tree Removal, Tamolitch Pools Trailhead, Carpet Hill Quarry and Deception Quarry Projects occur within critical habitat. This section only discusses impacts to critical habitat; refer back to Section 7.3 for discussion on Effects of Activities to Territorial Spotted Owls.

8.3.1 Dog River Pipeline

This action will occur within the NCN 7 critical habitat, six acres of PBFs functioning as suitable habitat and four acres of PBFs functioning as dispersal habitat.

No territories are known for this area of critical habitat. The pipeline project is a narrow (25 feet) linear project and as such is not expected to affect critical habitat/PBFs at the landscape scale to support the life history needs of territorial spotted owls.

Within this consultation, three projects are proposed within the McKenzie River RD that are also within critical habitat sub-unit WCS3.

8.3.2 Knoll Thin

This action will occur within the WCS 3 critical habitat. Knoll Thin is a mature stand between 80-120 years old and is judged to contain a mix of PBFs functioning as dispersal and suitable spotted owl habitat. Trees in the stand are 18-36” in diameter and are vigorously competing with neighboring trees for more space. Treatments would include 61 acres of commercial thinning, 6 acres of gaps, and 3 acres of skips. Thinning would primarily remove smaller, unhealthy trees and would be done with ground-based and skyline equipment. Because a minimum of a 40 percent canopy cover would be maintained, the stand would remain as dispersal habitat after treatment. With this level of canopy retention, it would be expected to again reach suitable habitat stand quality in about 15 years, and the overall stand structure is expected to improve, compared to no-treatment.

MSNO 2449

The Knoll Thin project would downgrade 55 acres of PBFs functioning as suitable habitat to dispersal within this territory. Suitable habitat after treatment from this project for this site would decline from 65 percent to 63 percent suitable, well above the 40 percent threshold level for the home range. After treatment, the core area remains at 77 percent suitable habitat. Therefore, within this territory critical habitat/PBFs are still expected to support the life history needs of territorial spotted owls.

MSNO 0829

The Knoll Thin project would downgrade 55 acres of PBFs functioning as suitable habitat to dispersal within the home range and downgrade 37 acres of suitable habitat to dispersal habitat in the core area. Suitable habitat would decline from 73 percent to 65 percent in the core area and from 63 percent to 61 percent in the home range after treatment well above threshold levels for functional home ranges. Therefore, within this territory critical habitat/PBFs are still expected to support the life history needs of territorial spotted owls.

8.3.3 Fish Lake Thin and Danger Tree Removal - Activity Center MSNO 0123

This action will occur within the WCS 3 critical habitat. Part of this project would downgrade about 39 acres of PBFs functioning as suitable owl habitat with a post-treatment habitat type of dispersal. The final overstory canopy in suitable spotted owl habitat after tree removal would be maintained at over 40 percent. Hazardous snags and trees near the Fish Lake Remount Depot buildings, access roads or other high use areas that pose a danger would be felled and removed.

MSNO 0123

The project would downgrade 3 acres of suitable habitat in critical habitat in the core area and 39 acres of suitable habitat in critical habitat in the home range. Suitable habitat after treatment from this project for this site would remain above the threshold for the core area (changing from 53% to 52% suitable) but not the home range. After treatment, the home range would have 24 percent suitable habitat, down from 26 percent before treatment. Therefore, within this territory critical habitat/PBFs are expected to be further below the desired levels to support the life history needs of territorial spotted owls.

The future trajectory of PBFs in the area needed to support the life history needs of territorial spotted owls at or above all recommended thresholds has not been delayed due to the projected development of dispersal habitat into suitable habitat within this territory.

8.3.4 Tamolitch Pools Trailhead - Activity Centers MSNO 0822 and MSNO 2838

This action will occur within the WCS 3 critical habitat.

The proposed parking lot installment is located within the 1.2 mile home ranges of two territories: MSNO 0822 and MSNO 2838.

MSNO 0822

This project would not appreciably change the percent of the current suitable critical habitat levels at this site (only 0.5 acres of suitable habitat in the home range would be removed maintaining suitable habitat at 58%). Therefore, within this territory critical habitat/PBFs are still expected to support the life history needs of territorial spotted owls.

MSNO 2838

This project would not appreciably change the percent of the current suitable critical habitat levels at this site (only 0.5 acres of suitable habitat in the home range would be removed maintaining suitable habitat at 73%). Therefore, within this territory critical habitat/PBFs are still expected to support the life history needs of territorial spotted owls.

8.3.5 Two Quarry Projects: Carpet Hill and Deception Quarry – Activity Center MSNO 2896

These actions will occur within the WCS 4 critical habitat. Within this consultation, two quarry expansions, each removing two acres of PBFs functioning as suitable habitat, are proposed on the Middle Fork RD within critical habitat sub-unit WCS4. One quarry site is associated with territory MSNO 2896. Because of the large amount of suitable habitat at the other quarry sites, the Middle Fork RD Biologist determined that removing two acres of suitable habitat would not alter PBFs at a territorial scale to support the life history needs of territorial spotted owls at the second quarry project: Deception Quarry. Additional discussion is provided in the project narratives in Appendix C.

Center MSNO 2896

PBFs functioning as suitable habitat of this territory exceeds 91 percent within the ½ mile core area. No treatment would occur in the core area. Within the 1.2 mile home range, PBFs 2 and 3 would be 77 percent after two acres of suitable habitat are removed to expand the quarry. Suitable habitat after treatment from this project for this site would remain above thresholds. Therefore, within this territory critical habitat/PBFs are still expected to support the life history needs of territorial spotted owls.

8.4 Effects of Activities to PBFs providing for the life history needs of Dispersing Spotted Owls

No projects are occurring in an area of concern for PBFs proving for the life history needs of dispersing spotted owls.

No projects are included in the proposed action that would remove PBFs in areas where post-activity remaining PBFs on the landscape would create a barrier or strong filter to dispersing spotted owls' movement and survival, in the opinion of the unit wildlife biologist (Appendix B and Appendix C).

8.5 Special Management Considerations for Critical Habitat

Summary of special management considerations for critical habitat area discussed below.

8.5.1 West Cascades/Coast Ranges of Oregon and Washington

1. Conserve older stands that have occupied or high-value spotted owl habitat as described in RA 10 (includes all territories, occupied or not), and RA 32 (older, high quality, and more structurally complex stands that support spotted owl recovery). On Federal lands, this recommendation applies to all land-use allocations.

There are five projects in critical habitat on the Willamette NF-two quarry expansions, one trailhead parking expansion, one project for defensible fire space around a historic site, and a timber sale/enhancement thin.

Carpet Hill and Deception Quarry Projects: The two quarry projects on the Middle Fork RD are specifically designed to avoid any RA 32 stands. The projects are proactive to RA 10 in that measures are in place to avoid adversely affecting the functionality of known or potential spotted owl sites (e.g. surveying to verify that no nest patches are affected) and the small acreage of habitat affected would not measurably reduce the functionality of any known or potential sites that could contribute to the conservation and recovery of spotted owls.

Tamolitch Pools Trailhead Improvement: This project avoids any RA 32 stands. It is proactive to RA 10 in that it avoids any known or potential owl core areas and the small amount of habitat removed would not measurably reduce the functionality of any known or potential sites that could contribute to the conservation and recovery of spotted owls.

Fish Lake Thin and Danger Tree Removal: The project would impact 39 acres of suitable habitat in critical habitat, including 36 acres of RA32 habitat. The proposed action would temporarily downgrade the habitat to dispersal habitat due to the reduction in overstory canopy, mid-story canopy, and understory cover. The large old legacy trees cohort (i.e. >38" dbh and >180 years), except for any danger trees near structures, would be retained so there would still be an old forest component only it would be more open and less structurally diverse. With no additional treatments the stands are expected to recover to suitable habitat in about 15-20 years.

The project area has been regularly surveyed for spotted owls as part of the HJA Demographic Study since the early 1990's and one known site overlaps the proposed treatments. The project would reduce the percent of suitable habitat in the core area from 53 percent to 52 percent and in the provincial home range from 26 percent to 24 percent. The territory has been unoccupied since 2009 and the site was given an RA 10 ranking of 9. Therefore, the activity would occur in a low-priority RA 10 site.

Knoll Thin: This project would thin a densely stocked 80-120 year old stand in critical habitat of which 55 acres are classified as suitable habitat and 12 acres are considered dispersal habitat. The purpose of the project is for timber production and to accelerate the development of structural complexity. It would temporarily downgrade the suitable habitat to dispersal habitat but improve longer-term suitable spotted owl habitat. The project would not affect any RA32 stands.

The project area has been regularly surveyed for spotted owls as part of the HJA Demographic Study and two known sites overlaps the proposed treatments. The project is consistent with RA10 direction to conserve sites and avoid nest patches and maintain the percent of suitable habitat in the core areas and PHR well above functional threshold levels (i.e. >60% suitable habitat would be maintained in all core areas and PHRs).

2. Management emphasis needs to be placed on meeting spotted owl recovery goals and long-term ecosystem restoration and conservation. When there is a conflict between these goals, actions that would disturb or remove the essential PBFs of spotted owl critical habitat need to be minimized and reconciled with long-term ecosystem restoration goals.

Carpet Hill and Deception Quarries: These projects do not contribute to meeting NSO recovery goals, however, the small scale of habitat removed would have minimal impact on the functionality of critical habitat and known spotted owl sites. Development of the quarries is need to support existing and proposed timber sale activities on the Middle Fork RD. Locations of potential rock sources are fixed and must be within reasonable proximity to other project activities to be cost effective. Therefore, the projects are proposed at existing quarries in critical habitat and one site is also in LSR.

Tamolitch Pools Trailhead Improvement: This project does not contribute to meeting spotted owl recovery goals, however, the small scale of habitat removed would have a minimal impact on the functionality of critical habitat and known and potential spotted owl sites. Expansion of the parking lot is needed to safely accommodate recreational users in the McKenzie River Wild and Scenic River Corridor.

Fish Lake Thin and Danger Tree Removal: This project does not contribute to meeting spotted owl recovery goals, but is has been proposed to emphasize public safety and better protection of a historic site from wild fires that could occur in that area. It could have a benefit, in that any fires that started on the site, would be easier to contain and prevent from spreading and adversely affecting adjacent spotted habitat. In the designing the projects, treatments were limited to areas surrounding the site and the existing legacy component in the stands was retained, except for a few hazard trees near buildings.

Knoll Thin: The thinning treatment would improve stand structure and tree growth rates after about 15 years or so which would improve future PBFs 2 and 3 in the stands and would maintain suitable habitat above threshold levels in spotted owl sites that overlap the project. Therefore it is consistent with spotted owl recovery goals.

3. Continue to manage for large, continuous blocks of late-successional forest.

Carpet Hill and Deception Quarries: This activity does not contribute to maintaining continuous blocks of late-successional forest, however, the small scale of habitat removed (4 acres) and the location along existing well-maintained roads would have a minimal impact on continuity and connectivity of late-successional forest habitat.

Tamolitch Pools Trailhead Improvement: The project would create a minor intrusion (0.5 acre) upon a relatively large, continuous block of late-successional forest that connects to the McKenzie River Wild and Scenic river corridor. The parking lot is directly adjacent to a forest road and would enlarge that opening created by the road corridor but would have a minimal impact on continuity and connectivity of late-successional forest habitat.

Fish Lake Thin and Danger Tree Removal: No large, continuous blocks of late-successional forest would be removed with this project. The proposed Fish Lake treatment stands are on the very edge of a large continuous block of late-successional forest which would be retained outside the treatment areas.

Knoll Thin: The thinning would reduce canopy cover to somewhat above 40 percent in 67 acres of 80-120 year old forest that is heavily-stocked. This treatment would improve long-term forest structural diversity in these 67 acres. Other late-successional forest adjacent to the treatment would be retained.

4. In areas that are not currently late-seral forest or high-value habitat and where more traditional forest management might be conducted (e.g., Matrix), these activities should consider applying ecological forestry prescriptions.

Carpet Hill and Deception Quarries, and Tamolitch Pools Trailhead Improvement: This management consideration is not applicable to these projects, because they are not forest management projects that could consider ecological forestry prescriptions.

Fish Lake Thin and Danger Tree Removal: The thinning treatment is designed to reduce fire risk, but it also includes no-treatment skips and retention of the largest and healthiest trees.

Knoll Thin: The thinning treatment is designed to improve long-term structural diversity in the stand. The treatment includes 6 acres of gaps with scattered trees and 3 acres of skips, thins from below retaining the largest conifer trees, and would retain 2-3 snags/acre and 2-3 downned trees/acres. Snags and downed trees would be created if not present at the retention levels specified.

8.5.2 East Cascades

Eight special management considerations or protections were identified for the East Cascades Critical Habitat Unit in the Final Critical Habitat Rule.

1. Conserve older stands that contain the conditions to support spotted owl occupancy or high-value spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands this recommendation applies to all land-use allocations (see also Thomas et al. 2006, pp. 284–285).

Dog River Pipeline: The only project in critical habitat in the East Cascades is 3.4 miles of road construction for pipeline replacement that would remove about 6 acres of suitable spotted owl habitat and 4 acres of dispersal habitat in LSR on the Mt. Hood NF. About 0.5 miles are in RA 32 stands. Completion of the pipeline replacement would not impact habitat at the stand scale because individual trees would be removed along a 25 foot wide corridor and would not impact the function of habitat in these stands.

2. Emphasize vegetation management treatments outside of spotted owl territories or highly suitable habitat;

Dog River Pipeline: This project is not a vegetation management treatment but rather a replacement of a leaking wooden pipe that has conveyed municipal water to the City of The Dalles since 1870.

3. Design and implement restoration treatments at the landscape level; N/A.
4. Retain and restore key structural components, including large and old trees, large snags, and downed logs; N/A.
5. Retain and restore heterogeneity within stands; N/A.
6. Retain and restore heterogeneity among stands; N/A.
7. Manage roads to address fire risk; N/A.
8. Consider vegetation management objectives when managing wildfires, where appropriate.

Dog River Pipeline: This project does not propose to manage wildfires.

8.6 Effects to Critical Habitat Sub-units.

The critical habitat sub-units ECN 7 and WCS 4 are expected to continue to provide for the life history needs of the spotted owls. The proposed action is not expected to create an alteration that appreciably diminishes the value of critical habitat sub-units ECN 7 and WCS 4 for the conservation of spotted owls as no adverse impacts to territories within these sub-units will occur. WCS 3 has one territory that is below recommended levels that will have additional PBFs functioning as suitable habitat downgraded to dispersal habitat. This territory, and therefore WCS3, is expected to continue to function in a similar manner as pretreatment, because the impact to PBFs is not expected to slow down greater landscape scale PBFs from obtaining the recommend levels of suitable habitat to support the life history needs of territorial spotted owls.

8.7 Effects to Critical Habitat Units.

No adverse impacts are expected at the scale of spotted owl critical habitat units, as no adverse effects are expected at the sub-unit scale.

8.8 Effects to Critical Habitat Network

No adverse impacts are expected at the scale of spotted owl critical habitat, as no adverse effects are expected at the unit scale.

9 Consistency with the NWFP

9.1 Large blocks of habitat for reproducing spotted owls.

Under the NWFP, it is expected that LUA's of LSRs, AMR and Congressionally Reserved areas will provide habitat to facilitate reproducing spotted owls. Only three projects are occurring in these land use allocations: Deception Quarry and Dog River Pipeline in LSR and Tamolitch Pools Trailhead Improvement in a Congressionally Reserved area. All three projects will still provide for spotted owl habitat at a spatial scale to support territory/breeding spotted owls post treatment (see section 8.3 Effects of Activities to PBFs providing for the life history needs of Territorial Spotted Owls).

9.2 Connectivity between Reserve Land Use Allocations

Under the NWFP, it is expected that LUA's outside of LSRs, AMR and Congressionally Reserved areas will provide adequate habitat to facilitate spotted owl movement and survival between reserved LUAs (USDA/USDI 1994a). No project will impair the ability of the landscape to support dispersing spotted owls (see section 7.4 Effects of Activities to Dispersing Spotted Owls). Therefore, the proposed actions will not reduce connectivity between reserve land use allocations for spotted owls.

10 Consistency with the Spotted Owl Recovery Plan

10.1 Recovery Action 6

In moist forests managed for spotted owl habitat, land managers should implement silvicultural techniques in plantations, overstocked stands and modified younger stands to accelerate the development of structural complexity and biological diversity that will benefit spotted owl recovery (USFWS 2011, page III-19). One project is implementing this concept: Knoll Thin.

The Knoll Thin project is designed to improve long-term structural diversity in the stand. The treatment includes 6 acres of gaps with scattered trees and 3 acres of skips, thins from below retaining the largest conifer trees, and would retain 2-3 snags/acre and 2-3 downed trees/acres. Snags and downed trees would be created if not present at the retention levels specified.

Other projects do not include Recovery Action 6 objectives.

10.2 Recovery Action 32

Table A-14 in Appendix A identifies the projects in suitable habitat, which meets the definition of Recovery Action 32 (USFWS 2011 pp. III-67). Two projects proposed by the McKenzie River Ranger District involve RA 32 habitat, as well as one project on the Barlow Ranger District of the Mt. Hood National Forest. Details follow below:

Fish Lake Thin and Danger Tree Removal: The McKenzie River RD is proposing to treat ~50 acres located in three stands. Thirty-six acres of RA32 habitat would be compromised due to the thinning and hazardous snag removal treatments. The rationale for this project is to protect the historic Fish Lake Remount Depot structures, and provide for the safety of forest users in that area.

Lower 19 Road Hazardous Fuels Treatment: Fire and Fuels Management is proposing a hazardous fuels reduction and Scotch Broom weed treatment in the 19 Road/410 Road area. The treatment would cover about 275 acres. Up to 190 acres of the proposed units may contain RA32 habitat, however a field determination has not yet been conducted and this may be a high estimate. While the proposed Lower 19 Road Hazardous Fuels Reduction Project would not result in a spotted owl habitat category change, it would include treatments in suitable and RA32 habitat. The treatments in RA 32 are being proposed to reduce fire risks and reduce illegal camping. This project would not modify the overall function of RA 32 habitat because only the understory would be treated. This treatment may help protect the treated stands as well as adjacent stands from catastrophic wildfire. The area is especially vulnerable to wildfire because the incidence of illegal camping in the area is high, and there have been multiple responses over the past several years to human-caused fires. The results of the treatments would somewhat reduce the overall quality of habitat in the short-term by removing understory hiding cover for spotted owl prey such as woodrats, as well as reduce stand structural diversity by removing small conifers and shrubs which would contribute to the stand structure in the long-term. About 15 years post-treatment, understory conifer regeneration and growth of the remaining understory trees and shrubs are expected to restore much of the understory cover used by spotted owl prey species.

Dog River Pipeline: The Barlow Ranger District is proposing to replace an existing municipal water pipeline located in 6 acres of suitable habitat and 4 acres dispersal habitat in LSR RO202 and ECN 7 critical habitat subunit. Existing live and dead trees would be cut within the 25-foot corridor (10.3 acres over the 3.4 mile long pipeline). The largest 5 percent of these trees will be felled and left on site to provide large down wood. Approximately 0.5 miles, or 1.5 acres, of RA 32 habitat would be affected. A seasonal restriction for cutting trees will be imposed from March 1 to July 15. The District wildlife biologist has inspected all trees to be cut and none of these trees currently provide nesting opportunities in the form of cavities or mistletoe brooms. The activity will reduce some large trees and small snags on the landscape, but because this tree removal is within a long narrow corridor, the LSR characteristics at the stand scale would remain the same. This project will not change the function of RA 32 habitat.

10.3 Recovery Action 10

Recovery Action 10 of the Revised Recovery Plan for the Northern Spotted Owl states: "Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population" (USFWS 2011, p. III-43). An interagency team was to be created that would identify these areas and make recommendations for areas to conserve and manage. The intent of this action is to protect, enhance, and develop habitat in the quantity and distribution necessary to provide for the long-term recovery of spotted owls. In the interim period, while the team process is formalized and developed, the Recovery Plan recommends that that Federal land managers work with the Service to prioritize current and historic spotted owl nest sites for conservation and/or maintenance of existing levels of habitat. Both the reproductive status and the existing site condition are factors to consider in prioritization.

Evaluation of consistency with Recovery Action 10 begins with prioritization of known and historic sites, and high value and unsurveyed habitat (potential sites). Prioritization factors to consider are provided in the Recovery Plan (USFWS 2011, p. III-44). Appendix F describes the prioritization process used in this biological assessment.

Prioritization is intended to provide a "guide to evaluate the relative impacts of management actions, and conservation of sites that provide the most support to spotted owl demography" (USFWS 2011, p. III-44). It is also intended to "…minimize impacts to potential spotted owl sites" (USFWS 2011, p. III-45).

In order to prioritize site conservation and habitat restoration, to analyze the effects of actions relative to RA10, and otherwise assess consistency with RA10, it was necessary to use the prioritization method described in Appendix F. This method incorporated RA10 considerations for site occupation, pair and reproduction status, in combination with habitat conditions in the 0.5 mile core area and 1.2 mile Provincial Home Range.

The Recovery Plan discourages forest management actions that diminish the home range's capacity to support spotted owl occupancy, survival and reproduction long-term, while recognizing that land managers have a variety of forest management obligations in addition to spotted owl considerations (USFWS 2011, p. III-45). Active forest management may be necessary to maintain or improve ecological conditions and the Recovery Plan supports projects that intend to provide long-term benefits to forest resiliency and restore natural forest dynamic processes. Such support is contingent on projects that are implemented in a landscape context and use carefully applied prescriptions that promote long-term forest health. Examples of active management include: forest stand restoration, fire risk reduction, treatments of insect infestations and tree disease, and restoration of high-quality early seral habitat as described by Swanson et al. (2010:entire).

10.3.1 Effects to specific known and potential spotted owl sites

Seven out of eight spotted owl sites are being conserved, see Table 24 and section 7.3 Effects of Activities to Territorial Spotted Owl.

Only spotted owl site 0123, unoccupied and below recommended habitat levels for spotted owls occupancy and reproduction, is likely to be adversely affected at the site scale. The Fish Lake Thin and Danger Tree Removal Project would downgrade 3 acres of suitable habitat in the core area and 39 acres of suitable habitat in the home range. Suitable habitat after treatment from this project for this site would remain above the threshold for the core area (changing from 53% to 52% suitable) but not the home range. After treatment, the home range would have 24 percent suitable habitat, down from 26 percent before treatment.

The future trajectory of this territory to obtain suitable habitat levels that meet the recommended guidelines has not been delayed due to the projected development of dispersal habitat into suitable habitat within this territory.

Table 24. Summary of Recovery Action 10 and proposed projects.

Resource area or Ranger District Project Spotted owl site number	Conservation of habitat at the site scale
Barlow RD	
Dog River Pipeline – no known sites (being surveyed)*	Yes*
McKenzie River RD	
410 Rootrot Removal Pocket	
2825 (RA 10 priority 8)	Yes**
0835 (RA 10 priority 2)	Yes***
Fish Lake Thin and Danger Tree Removal	
0123 (RA 10 priority 9)	No
Knoll Thin	
2449 (RA 10 priority 1)	Yes**
0829 (RA 10 priority 1)	Yes**
Lower 19 Road Hazardous Fuels – no known or potential sites	Not applicable
Tamolitch Pools Trailhead Improvement	
0822 (RA 10 priority 8)	Yes**
2838 (RA 10 priority 9)	Yes***
Middle Fork RD	
Carpet Hill Quarry	
2896 (RA 10 priority 1)	Yes**
Deception Quarry - no known sites (nest patch area being surveyed)*	Yes*
* Because of the large amount of suitable habitat in the larger area surrounding these projects, removing the small amount of suitable habitat is not expected to alter the	

functionality of any potential sites that might exist. Therefore, potential sites were not estimated for these projects.
** Habitat retained above recommended levels.
*** Habitat is below recommended levels, but habitat removed is extremely small (one acre), outside the core area, and expected to not affect the overall function of the site.

10.4 Summary of Consistency with the Spotted Owl Recovery Plan

Although four projects are for the needs of people, impacts to spotted owls have been minimized as much as feasible for these actions to take place. These projects are the Dog River Pipeline on the Barlow RD of the Mt. Hood NF;two quarry expansion projects (Carpet Hill and Deception Quarries) on the Middle Fork RD of the Willamette NF, andFish Lake Thin and Danger Tree Removal, a thinning and danger tree removal project to reduce fire risks to a historic site (people not spotted owls) on the Middle Fork RD of the Willamette NF.

These projects are consistent with RA 10 and RA 6 does not apply. The two quarry expansion projects will not affect RA 32 habitat. The water pipeline will affect RA 32 habitat, but it will not change the function of the RA 32 habitat because tree removal is within a long narrow (25 foot) corridor within larger stands of RA 32 habitat. Fish Lake Thin and Danger Tree Removal, the project to reduce fire risk to a historic site, will affect RA 32 habitat. RA 32 discusses allowing for other threats, such as fire. Although this fire reduction is for the benefit of people , RA 32 does not restrict the reason for the need to reduce fire risk in RA 32 habitat. Therefore, this project is consistent with RA 32.

The remaining three projects, all on the McKenzie River RD of the Willamette NF, offer benefits for spotted owls.

410 Rootrot Pocket Removal is a timber harvest to control rootrot. Controlling rootrot helps to maintain spotted owl habitat. Although small pockets of rootrot maybe beneficial to spotted owls by proving more diversity in prey, larger areas of rootrot limit the area spotted owls can forage. This project is consistent with RA 10 and 32. RA 6 does not apply.

Knoll Thinn is a timber harvest thinning to increase stand health. In the longer-term, Knoll Thinn should create more vegetation layers, larger sized trees, and greater canopy development compared to no-treatment. This is consistent with RA 6 and 32. This project will affect RA 10 habitat in a manner that will cause further impacts to an unoccupied spotted owl site. However, it is still consistent with RA 10 because the Forest Service is treating a lower priority site with long-term benefits to the habitat. Meaningful structural change in adversely affected stands will occur in an estimated 15 years, which is within the 30-year goal discussed under RA 10.

Lower Road 19 Hazardous Fuels Project is a fuel treatment in an area heavily used by people. Although the fuels treatment is simplifying the stands, it will provide protection to the landscape from fire. This project is consistent with RA 10. Although this project will affect RA 32 habitat, RA 32 discusses allowing for other threats, such as fire. Therefore, this project is consistent with RA 32.

11 Cumulative Effects

Except as supplemented and edited by the Service, the following cumulative effects section is from the BA (FS 2016, pp. 76).

Cumulative effects are those effects of future State or private activities (not involving Federal activities) that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 Definitions). The action area includes lands within the Mt. Hood and Willamette NFs associated with the proposed projects and non-federal and Federal lands within 1 mile of the proposed projects. Within the project narratives, only Lower Road 19 Fuel Reduction project makes reference to adjacent private lands.

The Level 1 Terrestrial Team is unaware of any proposed future State or private actions on non-federal land within the action area.

Although the Terrestrial Level 1 Team is lacking information on spotted owls or spotted owl habitat for non-federal lands within the action area, non-federal lands within the Mt. Hood and Willamette NF boundaries usually only support marginal habitats, and do not notably contribute to the viability of the spotted owl. These lands, however, support some dispersal habitat for spotted owls and may contribute to the reproduction, health, and condition of spotted owls on adjacent Federal land. Habitat conditions on these lands are not expected to improve significantly within the foreseeable future and, as a result, are not expected to contribute to the survival and recovery of the spotted owl.

To date, the Oregon Forest Practice Rules have not adopted regulations that provide adequate protection to spotted owl sites or a mechanism to identify sites on the landscape (e.g., surveys in suitable habitat). The rules require protection of a 70-acre core area around active nest sites only, and do not provide any protection or conservation of other surrounding habitat. For a species that requires up to several thousand acres of habitat to persist, these rules allow for the progressive elimination of active spotted owl sites. Removal of large amounts of habitat around 70-acre cores will eventually render the core nest areas non-functional and displacement of spotted owls is the likely outcome.

12 Climate Change

Numerous studies have documented changes in species distribution, movement, and demography associated with changing climatic conditions. In addition, changes in forest composition and structure as well as ecosystem structure and function resulting from climate change may impact availability of habitat for spotted owls (Appendix G).

The majority of proposed projects are not designed to promote habitat retention relating to climate change. These project are: a pipeline road on the Barlow RD of the Mt. Hood NF, two quarry expansion projects on the Middle Fork RD of the Willamette NF, and a thinning and danger tree removal project to reduce fire risks to a historic site (people not spotted owls) on the Middle Fork RD of the Willamette NF.

Three proposed projects on the McKenzie River RD of the Willamette NF may provide benefits to spotted owls in a changing climate scenario. 410 Rootrot Pocket Removal is a timber harvest to control rootrot. Areas that are having rootrot susceptible trees removed are being replanted with non-rootrot susceptible trees: noble fir (*Abies procera)*, western red cedar (*Thuja plicata*), Sugar pine (*Pinus lambertiana*), and western white pine (*Pinus monticola*). These trees are drought resistant and should add resilience to the spotted owl habitat in a warmer and dryer scenario. Knoll Thinn is a timber harvest thinning to increase stand health. Healthier stands also add resilience to the spotted owl habitat in a changing climate. Lower Road 19 Hazardous Fuels Project is a fuel treatment in an area heavily used by people. Although the fuels treatment is simplifying the stands, it will provide protection from fire. Increase risk of spotted owl habitat is a concern in relation to climate change in the Northwest and reducing high fire risk will benefit the retention of spotted owl habitat at the landscape level.

13 Spotted Owl - Conclusion

After reviewing the current status of the spotted owl, the environmental baseline for the action area, the effects of the proposed action, together with the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the spotted owl.

The Service reached this conclusion based on the following findings:

1. The proposed project will not appreciably reduce the likelihood of survival or recovery for the spotted owl population at the scale of territories, the landscape, physiographic provinces or range-wide because impacts are not expected to rise to a level that would affect the biology of breeding spotted owls at a territorial scale nor dispersing spotted owls at a landscape scale.
2. The conservation needs of the spotted owl will continue to be met at the provincial and range-wide scale because the proposed action will conform to the guidance and strategy of the NWFP. Mt. Hood and the Willamette NFs will still provide for the function of large blocks of habitat for reproducing spotted owls and the ability of the landscape to support spotted owl movement between those blocks.
3. The conservation needs of the spotted owl will continue to be met at the physiographic province and range-wide scale because the proposed action will conform to the guidance of the Recovery Plan for the spotted owl as currently interpreted.
4. No known cumulative impacts changed the determinations made under the effects of the proposed action.
5. No potential climate change interactions change the determinations made under the effects of the proposed action.

14 Spotted Owl Critical Habitat - Conclusion

After reviewing the current status of spotted owl critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to destroy or adversely modify spotted owl critical habitat.

The Service reached this conclusion based on the following findings:

1. There will not be a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of spotted owls. Specifically the conservation needs of the spotted owl will not be significantly impacted at the sub-unit, unit and range-wide scales. The proposed actions will not adversely affect the ability of the landscape to support dispersing spotted owls. The proposed projects will impact, at the territorial scale, the ability of critical habitat to support terrestrial spotted owls at one spotted owl territory. The one impacted territory is below recommended levels for the home range, but the proposed fire reduction project will not reduce the time needed for the territory to acquire recommend levels of suitable habitat within the home range. Therefore, at the scale of sub-unit, unit, and range wide critical habitat, the Service believes the proposed project will not appreciably diminish the conservation value of critical habitat for both the survival or recovery of the spotted owl population.
2. The proposed action will conform to the guidance of the Recovery Plan for the spotted owl as currently interpreted which will contribute the conservation needs of the spotted owl.
3. No cumulative impacts that were reasonably certain to occur changed the determinations made under the effects of the proposed action.
4. No potential climate change interactions changed the determinations made under the effects of the proposed action.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2) of the Act, take that is incidental to and not intended as part of the agency action is not considered to be a prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by FS so that they become binding conditions of any grant or permit issued to any applicant, as appropriate, for the exemption in section 7(o)(2) to apply. FS have a continuing duty to regulate the activities covered by this Incidental Take Statement. If FS: (1) fails to assume and implement the terms and conditions; or (2) fails to require cooperators to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, FS must report the progress of the action and its impact on the species to the Service as specified in this Incidental Take Statement. [50 CFR §402.14(i)(3)]

15 Amount or Extent of Take anticipated

Based on guidance from the solicitor's review of the Arizona Cattle Growers Association Case, the Service is to be reasonably certain of anticipated take (USFWS 2002, page 2).

No take is reasonably certain to occur at this time because the one known spotted owl territory that will have significant impacts to the territory's functionality to support spotted owls is currently unoccupied.

16 Effect of Take

Not applicable as no take was anticipated.

17 Reasonable and Prudent Measures

Not applicable as no take was anticipated.

Note: General Standards (section 1.2) includes monitoring of projects.

18 Terms and Conditions

Not applicable as no take was anticipated.

If a dead, injured, or sick endangered or threatened species specimen is located, initial notification must be made to the nearest Service Law Enforcement Office, located at 9025 SW Hillman Court, Suite 3134, Wilsonville, Oregon 97070; phone: 503-682-6131. Care should be taken in handling sick or injured specimens to ensure effective treatment or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered and threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

CONSERVATION RECOMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by implementing conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities designed to minimize or avoid adverse effects of a proposed action on listed species or designated critical habitat, to assist in the implementation of recovery plans or to obtain information.

The Service believes the following conservation recommendation will reduce the impact of the proposed action on nesting spotted owls within the action area:

1. Coordinate with the Service to fund and/or conduct research on removal of barred owls from FS and BLM lands to evaluate subsequent response by spotted owls and inform future management decisions of spotted owls and their habitat.

In order for the Service to be kept informed of actions that minimize or avoid adverse effects for the benefit of listed species or their habitats, the Service requests notification regarding the implementation of any conservation recommendation.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in your Biological Assessment. As provided in (50 CFR § 402.16), reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agencies' action that may affect listed species or critical habitat in a manner or to an extent not considered in this BO; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this BO; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation of formal consultation.

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APPENDIX A: Summary Tables for Proposed Projects in this Consultation*

The following summary tables of the proposed action for spotted owls and their critical habitat are from the BA (FS 2016, pp. 94-107).

Table A- 1. Levels of treatment proposed by each administrative unit in this consultation.

Activity x Admin Unit (acres)				
Activity	Barlow RD	McKenzie River RD	Middle Fork RD	Grand Total
Fuels Treatment		275		275
Harvest Habitat Maintain		27.5		27.5
Harvest Habitat Remove		3	4	7
Road Construction	10			10
Harvest Habitat Downgrade		94		94
Grand Total	10	399.5	4	413.5

Activity in NSO Critical Habitat x Admin Unit (acres)				
Activity	Barlow RD	McKenzie River RD	Middle Fork RD	Grand Total
Harvest Habitat Maintain		12		12
Harvest Habitat Remove		1.5	4	5.5
Road Construction	10			10
Harvest Habitat Downgrade		94		94
Grand Total	10	107.5	4	121.5

Table A- 2. Harvest Habitat Remove proposed in this consultation.

Ranger District/ Resource Area	Project Name	Acres	Land Use Allocation	Current Habitat	Habitat Functionality Change	Effect-Hab Mod	Effect-Disruption	2012 CHU Subunit	CHU2012 acres	Effect to 2012 CHU	Acres in RA 32 Habitat
McKenzie River RD	410 Rootrot Removal Pocket	1	Matrix	Suitable	Habitat removed	LAA	NLAA-outside disruption distance/time				0
McKenzie River RD	410 Rootrot Removal Pocket	0.5	Matrix	Dispersal	Habitat removed	NLAA	NLAA-outside disruption distance/time				0
McKenzie River RD	Tamolitch Pools Trailhead Improvement	0.5	Cong withdrawn	Suitable	Habitat removed	LAA	NE	WCS 3	0.5	LAA	0
McKenzie River RD	Tamolitch Pools Trailhead Improvement	1	Cong withdrawn	Non-habitat	Non-habitat	NLAA	NE	WCS 3	1	NLAA	0
Middle Fork RD	Carpet Hill Quarry	2	Matrix	Suitable	Habitat removed	LAA	NLAA-outside disruption distance/time	WCS 4	2	LAA	0
Middle Fork RD	Deception Quarry	2	LSR	Suitable	Habitat removed	LAA	NLAA-outside disruption distance/time	WCS 4	2	LAA	0
	TOTAL	7.0							5.5		0

Table A- 3. Harvest Habitat Downgrade proposed in this consultation.

Ranger District/ Resource Area	Project Name	Proposed Activity	Acres	Land Use Allocation	Current Habitat	Habitat Functionality Change	Effect-Hab Mod	Effect-Disruption	2012 CHU Subunit	CHU2012 acres	Effect to 2012 CHU	Acres in RA 32 Habitat
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	21	Matrix	Suitable	Suitable downgraded to dispersal	LAA	NE	WCS 3	21	LAA	21
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	18	Admin withdrawn	Suitable	Suitable downgraded to dispersal	LAA	NE	WCS 3	18	LAA	15
McKenzie River RD	Knoll Thin	Harvest Habitat Downgrade	55	Matrix	Suitable	Suitable downgraded to dispersal	LAA	NLAA-outside disruption distance/time	WCS 3	55	LAA	0
		TOTAL	94							94		36

Table A- 4. Harvest Habitat Maintain proposed in this consultation.

Ranger District/ Resource Area	Project Name	Proposed Activity	Acres	Land Use Allocation	Current Habitat	Habitat Functionality Change	Effect-Hab Mod	Effect-Disruption	2012 CHU Subunit	CHU2012 acres	Effect to 2012 CHU	Acres in RA 32 Habitat
McKenzie River RD	Fish Lake Thin and Danger Tree Removal	Harvest Habitat Maintain	11	Admin withdrawn	Non-habitat	Habitat maintained	NE	NE				
McKenzie River RD	Knoll Thin	Harvest Habitat Maintain	12	Matrix	Dispersal	Habitat maintained	NLAA	NLAA-outside disruption distance/time	WCS 3	12	NLAA	0
McKenzie River RD	410 Rootrot Removal Pocket	Harvest Habitat Maintain	4.5	Matrix	Non-habitat	Non-habitat	NE	NE				
		TOTAL	27.5							12		0

Table A- 5. Fuels Treatment proposed in this consultation.

Ranger District/ Resource Area	Project Name	Proposed Activity	Acres	Land Use Allocation	Current Habitat	Habitat Functionality Change	Effect- Hab Mod	Effect- Disruption	2012 CHU Subunit	CHU 2012 acres	Effect to 2012 CHU	Acres in RA 32 Habitat
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	252	AMA	Suitable	Habitat maintained	LAA	NLAA- outside disruption distance/time		0		190
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	8	AMA	Dispersal	Habitat maintained	NLAA	NLAA- outside disruption distance/time		0		0
McKenzie River RD	Lower 19 Road Hazardous Fuels	Fuels Treatment	15	AMA	Non-habitat	Non-habitat	NLAA	NLAA- outside disruption distance/time		0		0
		TOTAL	275							0		190

Table A- 6. Road Construction proposed in this consultation.

Ranger District/ Resource Area	Project Name	Proposed Activity	Acres	Land Use Allocation	Current Habitat	Habitat Functionality Change	Effect-Hab Mod	Effect-Disruption	2012 CHU Subunit	CHU 2012 acres	Effect to 2012 CHU	Acres in RA 32 Habitat
Barlow RD	Dog River Pipeline	Road Construction	6	LSR	Suitable	Habitat removed	LAA	NLAA-outside disruption distance/time	ECN 7	6	LAA	1.5
Barlow RD	Dog River Pipeline	Road Construction	4	LSR	Dispersal	Habitat removed	NLAA	NLAA-outside disruption distance/time	ECN 7	4	LAA	0
		TOTAL	10							10		1.5

Table A- 7. Effects to spotted owl suitable and dispersal habitat.

Acres							
Current Habitat	Habitat Functionality Change	AMA	LSR[1]	Matrix	Admin Withdrawn	Congress Withdrawn	Grand Total
Dispersal	Habitat maintained[4]	8		12			20
	Habitat removed[2]		4[5]	0.5			4.5
Dispersal Total		8	4	12.5			24.5
Non-habitat	Habitat maintained[4]	15		4.5	11	1	31.5
Non-habitat Total		15		4.5	11	1	31.5
Suitable	Habitat maintained[4]	252					252
	Habitat removed[4]		8[6]	3		0.5	11.5
	Suitable downgraded to dispersal[3]			76	18		94
Suitable Total		252	8	79	18	0.5	357.5
Grand Total		275	12	96	29	1.5	413.5

1 Includes associated Riparian Reserves and 100-acre LSRs

2 Habitat removed means to eliminate the functionality of this type of habitat (i.e., removal of suitable or dispersal habitat results in non-habitat after treatment).

3 Habitat downgraded means to change the functionality of the habitat from suitable to dispersal.

4 Habitat maintained means that current functionality of habitat is maintained (i.e., suitable habitat remains suitable and dispersal habitat continues to function as dispersal).

5 All acres are in the East Cascades.

6 Six acres are in the East Cascades.

Table A- 8. Effects to spotted owl habitat by activity type.

Acres							
	Dispersal		Non-habitat	Suitable			
Activity	Habitat maintained	Habitat removed	Habitat maintained	Habitat maintained	Habitat removed	Suitable downgraded to dispersal	Grand Total
Fuels Treatment	8		15	252			275
Harvest Habitat Downgrade						94	94
Harvest Habitat Maintain	12		15.5				27.5
Harvest Habitat Remove		0.5	1		5.5		7
Road Construction		4		-	6		10
Grand Total	20	4.5	31.5	252	11.5	94	413.5

Table A- 9. Proposed habitat modification activities in spotted owl critical habitat (2012).

Acres							
Current Habitat	Habitat Functionality Change	AMA	LSR[1]	Matrix	Admin Withdrawn	Congress Withdrawn	Grand Total
Dispersal	Habitat maintained[4]			12			12
	Habitat removed[2]		4				4
Dispersal Total			4	12			16
Non-habitat	Habitat maintained[4]					1	1
Non-habitat Total						1	1
Suitable	Habitat maintained[4]						0
	Habitat removed[4]		8	2		0.5	10.5
	Suitable downgraded to dispersal[3]			76	18		94
Suitable Total			8	78	18	0.5	104.5
Grand Total		0	12	90	18	1.5	121.5

[1] Includes associated Riparian Reserves and 100-acre LSRs

[2] Habitat removed means to eliminate the functionality of this type of habitat (i.e., removal of suitable or dispersal habitat results in non-habitat after treatment).

[3] Habitat downgraded means to change the functionality of the habitat from suitable to dispersal.

[4] Habitat maintained means that current functionality of habitat is maintained (i.e., suitable habitat remains suitable and dispersal habitat continues to function as dispersal).

Table A- 10. Proposed habitat modification activities in 2012 spotted owl Critical Habitat by activity.

Activity in Critical Habitat (acres)							
	Dispersal		Non-habitat	Suitable			
Activity	Habitat maintained	Habitat removed	Habitat maintained	Habitat maintained	Habitat removed	Suitable downgraded to dispersal	Grand Total
Fuels Treatment							0
Harvest Habitat Downgrade						94	94
Harvest Habitat Maintain	12						12
Harvest Habitat Remove			1		4.5		5.5
Road Construction		4			6		10
Grand Total	12	4	1	0	10.5	94	121.5

Table A- 11. Proposed habitat modification in 2012 spotted owl critical habitat subunits.

Activity in Critical Habitat Subunit (acres)							
CHU Subunit / Activity	Dispersal		Non-habitat	Suitable			Grand Total
	Habitat maintained	Habitat removed	Habitat maintained	Habitat maintained	Habitat removed	Suitable downgraded to dispersal	
ECN 7							
Road Construction		4			6		10
ECN 7 Total		4			6		10
WCS 3							
Harvest Habitat Downgrade						94	94
Harvest Habitat Maintain	12						12
Harvest Habitat Remove			1		.5		1.5
WCS 3 Total	12	0	1	0	.5	94	107.5
WCS 4							
Harvest Habitat Remove					4		4
WCS 4 Total					4		4
Grand Total	12	4	1	0	10.5	94	121.5

Table A- 12. Effects to spotted owls by activity.

NSO Effect Habitat Modification Acres					
Activity		LAA	NE	NLAA	Grand Total
Fuels Treatment		252	15	8	275
Harvest Habitat Downgrade		94			94
Harvest Habitat Maintain			15.5	12	27.5
Harvest Habitat Remove		5.5		1.5	7
Road Construction		6		4	10
Grand Total		357.5	30.5	25.5	413.5

NSO Effect Disturbance Acres			
Activity	NE	NLAA-outside disruption distance/time	Grand Total
Fuels Treatment		275	275
Harvest Habitat Downgrade	39	55	94
Harvest Habitat Maintain	11	16.5	27.5
Harvest Habitat Remove	1.5	5.5	7
Road Construction		10	10
Grand Total	51.5	362	413.5

NSO Effect Critical Habitat Acres				
Activity	LAA	NE	NLAA	Grand Total
Harvest Habitat Downgrade	94			94
Harvest Habitat Maintain			12	12
Harvest Habitat Remove	4.5		1	5.5
Road Construction	10			10
Grand Total	108.5	0	13	121.5

Table A- 13. Proposed projects in Late Successional Reserves.

LSR Number or category	Ranger District/ Resource Area	Project Name	Proposed Activity	Current Habitat	Habitat Functionality Change	Effect- Hab Mod	Acres
RO202	Barlow RD	Dog River Pipeline	Road Construction	Suitable	Habitat removed	LAA	6
RO202	Barlow RD	Dog River Pipeline	Road Construction	Dispersal	Habitat removed	NLAA	4
RO222	Middle Fork RD	Deception Quarry	Harvest Habitat Remove	Suitable	Habitat removed	LAA	2
						TOTAL	12

Table A- 14. Proposed projects in RA 32 Habitat.

Acres in RA 32 Habitat			
Ranger District	Proposed Activity	Project Name	Acres in RA 32 Habitat
McKenzie River RD	Fuels Treatment	Lower 19 Road Hazardous Fuels Treatment	190
McKenzie River RD	Harvest habitat Downgrade	Fish Lake Thin and Danger Tree Removal	36
Barlow RD	Road Construction	Dog River Pipeline	1.5
Grand Total			227.5

Table A- 15. Environmental baseline of northern spotted owl sites affected by activities in project area.

Ranger District	Known Site ID	Project Name	LUA (Activity center)	2012 critical habitat Subunit (Activity Center)	Core Area Current Suitable Acres (% suitable)	Home Range Current Suitable Acres (% suitable)	Recovery Action 10 Priority Rank
Middle Fork RD	2896	Carpet Hill Quarry	Matrix	WCS 4	458 (91%)	2232 (77%)	1
McKenzie River RD	2825	410 Rootrot Pocket Removal	LSR-100ac	Not in CH	314 (62%)	1551 (54%)	8
McKenzie River RD	835	410 Rootrot Pocket Removal	LSR-100ac	Not in CH	202 (40%)	906 (31%)	2
McKenzie River RD	123	Fish Lake Thin and Danger Tree Removal Project	Matrix	WCS 3	265 (53%)	744 (26%)	9
McKenzie River RD	2449	Knoll Thin	Matrix	WCS 3	389 (77%)	1880 (65%)	1
McKenzie River RD	829	Knoll Thin	Cong withdrawn	WCS 3	365 (73%)	1824 (63%)	1
McKenzie River RD	822	Tamolitch Pools Trailhead Improvement	Matrix	WCS 3	430 (85%)	2125 (73%)	8
McKenzie River RD	2838	Tamolitch Pools Trailhead Improvement	Matrix	WCS 3	242 (48%)	1673 (58%)	9

All spotted owl sites are in the west Cascades, no activities are proposed in nest patches, and there are no potential sites affected by project activities in this consultation. Core areas and home ranges with suitable habitat below threshold levels are underlined and highlighted in bold.

Table A- 16. Summary of effects to spotted owl sites.

Ranger District	Known Site ID	Project Name	2012 critical habitat Subunit (Activity Center)	Core Area Post-treatment Suitable Acres (% suitable)	Home Range Post-treatment Suitable Acres (% suitable)	Summary of Effects to Spotted Owl Site

Ranger District	Known Site ID	Project Name	2012 critical habitat Subunit (Activity Center)	Core Area Post-treatment Suitable Acres (% suitable)	Home Range Post-treatment Suitable Acres (% suitable)	Summary of Effects to Spotted Owl Site
Middle Fork RD	2896	Carpet Hill Quarry	WCS 4	458 (91%)	2230 (77%)	Two acres of suitable habitat would be removed in the home range outside the core area. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	2825	410 Rootrot Pocket Removal	Not in CH	314 (62%)	1550 (54%)	One acre of suitable habitat would be removed in the home range outside the core area. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	835	410 Rootrot Pocket Removal	Not in CH	202 (40%)	905 (31%)	One acre of suitable habitat would be removed in the home range outside the core area. There would be no significant negative effect to the functionality of this site due to the small amount of habitat removed outside the core area.
McKenzie River RD	123	Fish Lake Thin and Danger Tree Removal Project	WCS 3	262 (52%)	705 (24%)	Three acres and 39 acres of suitable habitat would be downgraded in the core area and the home range, respectively. The downgrade is not expected to harm any spotted owls because the site has not been occupied since 2009. It is expected that this site will continue to be surveyed as part of the HJA Demographic Study Area throughout the implementation of the project. If spotted owls are detected in this territory,

Ranger District	Known Site ID	Project Name	2012 critical habitat Subunit (Activity Center)	Core Area Post-treatment Suitable Acres (% suitable)	Home Range Post-treatment Suitable Acres (% suitable)	Summary of Effects to Spotted Owl Site
						consultation will be reinitiated.
McKenzie River RD	2449	Knoll Thin	WCS 3	389 (77%)	1825 (63%)	Fifty five acres of suitable habitat would be downgraded in the home range outside the core area. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	829	Knoll Thin	WCS 3	328 (65%)	1769 (61%)	Thirty seven acres and 55 acres of suitable habitat would be downgraded in the core area and the home range, respectively. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	822	Tamolitch Pools Trailhead Improvement	WCS 3	430 (85%)	2125 (73%)	One half acre of suitable habitat would be removed in the home range outside the core area. The functionality of the site would be maintained due to suitable habitat being above threshold levels.
McKenzie River RD	2838	Tamolitch Pools Trailhead Improvement	WCS 3	242 (48%)	1673 (58%)	One half acre of suitable habitat would be removed in the home range outside the core area. There would be no significant negative effect to the functionality of this site due to the small amount of habitat removed outside the core area.

All spotted owl sites are in the west Cascades, no activities are proposed in nest patches, and there are no potential sites affected by project activities in this consultation. Core areas and home ranges with suitable habitat below threshold levels are underlined and highlighted in bold.

APPENDIX B: Mt. Hood National Forest

Unit Specific Data

The following Mt. Hood National Forest tables of the proposed action for spotted owls and their critical habitat are from the BA (FS 2016, pp. 108-119).

There are no projects proposed by the Columbia River Gorge National Scenic Area, and the Clackamas, Hood River, and Zig Zag Ranger Districts in this consultation.

Only the Barlow Ranger District has a proposed project for this consultation.

Table B- 1. Proposed projects for the Mt Hood National Forest) during FY2017-2018.

Mt Hood NF – East Side Cascades, Barlow Ranger District

Project Name	Proposed Activity	Acres	Land Use Allocation	LSR Number or category	Current Habitat	Habitat Functionality Change	Effect-Hab Mod	Effect-Disruption	2012 CHU Subunit	CHU2012 acres	Effect to 2012 CHU	Acres in RA 32 Habitat	Rationale for projects should be submitted separately in project narrative. Comments specific to certain rows may be entered here.
Dog River Pipeline	Road Construction	6	LSR	RO202	Suitable	Habitat removed	LAA	NLAA-outside disruption distance/time	ECN 7	6	LAA	0	The pipeline would permanently eliminate any potential for the 10 acres of critical habitat to ever contribute to spotted owl recovery. Thus the LAA effect to critical habitat.
Dog River Pipeline	Road Construction	4	LSR	RO202	Dispersal	Habitat removed	NLAA	NLAA-outside disruption distance/time	ECN 7	4	LAA	0	

No known spotted owl sites or potential sites would be affected by the Dog River Pipeline.

Table B-2. Status of the spotted owl and its habitat, Mt Hood NF - 2016.

Mt Hood National Forest	Total Acres	Protected[1]		Unprotected[2]		Non Forest Service land within administrative unit boundary	
		Total Acres	% of Total	Total Acres	% of Total	Total Acres	% of Total
Acres within Boundary[3]	1,067,017	500,685	47%	566,332	53%	46,662	4%
Acres of Ownership[4]	1,020,355	500,685	49%	519,670	51%		
Suitable Habitat – Capable Acres[5]	939,986	455,172	48%	484,814	52%		
Suitable Habitat – Current Acres[6]	399,905	227,946	57%	171,959	43%		

Spotted owl Known Sites	Number of Sites	Protected	% of Total	Unprotected	% of Total
Spotted owl Known Sites[7]	297	150	51%	147	49%
Spotted Owl Sites with ≥ 50% suitable habitat in the core area	159	83	52%	76	48%
Spotted Owl sites with ≥ 40% suitable habitat in the provincial home range	174	92	52%	82	48%
Spotted owl sites with ≥ 50% suitable habitat in the core area AND ≥ 40% suitable habitat in the provincial home range	138	73	53%	65	47%

[1] Acres in this column are comprised of: Late Successional Reserves (LSR) and associated Riparian Reserves, 100-acre LSRs, Congressionally Withdrawn Areas.

[2] Acres in this column are comprised of: Matrix, Adaptive Management Areas, and Administratively Withdrawn Areas including associated Riparian Reserves. Administratively Withdrawn Areas are included in the unprotected column because technically these areas are not designed to provide spotted owl habitat but rather to serve some other function such as "recreation and visual areas, back country, and other areas where management emphasis precludes scheduled timber harvest" (USDA, and USDI 1994a, p. A-4). The administrative land and resource management plan may protect and/or reduce the likelihood that spotted owl habitat located within Administratively Withdrawn Areas would be modified.

[3] Acres include both private and federal lands within administrative boundaries (in this row only). Acres are derived from corporate GIS data. **Unprotected column includes all non-FS acres.**

[4] Does not include approximately 3,042 acres (total) of Mt Hood NF land managed by the Willamette NF (for this and subsequent rows). These acres are included in the Willamette NF data, Appendix D.

[5] Federal land that is capable of producing suitable spotted owl habitat, regardless of its current habitat.

[6] Suitable habitat is defined as nesting, roosting, foraging habitat.

[7] Known sites represent pairs or resident singles 1990-2011. Location of site center (only) used to depict whether in protected or unprotected Land Use Allocations.

Data has been updated to reflect changes due to past harvest, land exchanges, GIS updates or new locations of spotted owl sites.

Table B-3. Status of the spotted owl and its habitat, CRGNSA - 2016.

The following is baseline information for the Oregon portion of the Columbia River Gorge National Scenic Area (CRGNSA). Land Use Allocations were obtained from the 2002 Land Use Allocation Update provided on the Regional Ecosystem Office website (http://www.reo.gov/gis/data/gisdata/index.htm). Wilderness boundaries of the Mark Hatfield Wilderness were extended in 2010. Ownership of the land base was updated in 2011. The CRGNSA has relatively frequent land exchanges or purchases since there more than half of the land within the administrative boundary is currently not in Forest Service ownership. The CRGNSA also encompasses numerous state parks as well as small towns and other urban areas.

Columbia River Gorge National Scenic Area (Oregon only)	Total Acres	Protected[1]		Unprotected[2]		Non Forest Service land within administrative unit boundary	
		Total Acres	% of Total	Total Acres	% of Total	Total Acres	% of Total
Acres within Boundary[4]	106,082	33,861	32%	72,221	68%	60,318	57%
Acres of Ownership[5]	45,308	32,527	71%	12,781	29%		
Suitable Habitat – Capable Acres	39,112.	32,455	83%	6,657	17%		
Suitable Habitat – Current Acres[6]	26,943	23,667	88%	3,276	12%		

Spotted owl Known Sites	Number of Sites	Protected	% of Total	Unprotecte d	% of Total
Spotted owl Known Sites[7]	3	3	100%	0	0%
Spotted Owl Sites with ≥ 50% suitable habitat in the core area	3	3	100%	0	0%
Spotted Owl sites with ≥ 40% suitable habitat in the provincial home range	3	3	100%	0	0%
Spotted owl sites with ≥ 50% suitable habitat in the core area AND ≥ 40% suitable habitat in the provincial home range	3	3	100%	0	0%

[1] Acres in this column are comprised of: Late Successional Reserves (LSR) and associated Riparian Reserves, 100-acre LSRs, and Congressionally Withdrawn Areas.

[2] Acres in this column are comprised of: Administratively Withdrawn Areas including associated Riparian Reserves. Administratively Withdrawn Areas are included in the unprotected column because technically these areas are not designed to provide spotted owl habitat but rather to serve some other

function such as "recreation and visual areas, back country, and other areas where management emphasis precludes scheduled timber harvest" (USDA, and USDI 1994a, p. A-4). The administrative land and resource management plan may protect and/or reduce the likelihood that spotted owl habitat located within Administratively Withdrawn Areas would be modified.

There are no Matrix or Adaptive Management Area lands on the CRGNSA (Oregon).

[3] Due to recent land exchanges and acquisitions, not all FS-owned land in the CRGNSA (Oregon) has defined Land Use Allocations, as defined by most recent (2002) NFP Land Use Allocation designation by the Regional Ecosystem Office (REO). The administrative unit uses other Land Use designations and the REO has not defined NFP allocations on these new parcels of land.

[4] Acres include both federal and non-federal lands within administrative boundaries (in this row only). These acres are derived from corporate GIS data, last updated in 2011. **Unprotected column includes all non-FS acres.**

[5] Land in Forest Service ownership within the Columbia River Gorge National Scenic Area (Oregon only).

[6] Suitable habitat is defined as nesting, roosting, foraging habitat.

[7] Known sites represent pairs or resident singles 1990-2011. Location of site center is shown in either protected or unprotected Land Use Allocations.

Note: Data has been updated to reflect changes due to past harvest, land exchanges, GIS updates or new locations of spotted owl sites.

Table B-4. Late-successional reserves and associated spotted owl habitat, Mt Hood NF and Columbia River Gorge National Scenic Area – 2016.

Note that several new and existing wildernesses were enlarged with portions of existing LSRs. These acres are not listed here, but are shown in Table 6c as part of the LSR/Wilderness complexes.

Late-Successional Reserves	Total Acres	Total Capable Acres	Suitable Acres	% suitable (of capable)
Mt Hood National Forest				
RO201[1]	76,261	74,330	40,388	54%
RO202	23,687	19,662	8,847	45%
RO203[2]	3,039	2,947	1,006	34%
RO204[3]	21,549	18,679	9,757	52%
RO205[4]	196	196	79	40%
RO206[4]	342	342	110	32%
RO207[5]	62,847	53,135	29,111	55%
RO208[6]	1,955	1,800	1,262	70%
RO209[7]	5,241	5,210	2,173	42%
RO210[7]	8,718	8,502	5,053	59%
Total	203,835	184,804	97,787	53%
Columbia River Gorge National Scenic Area (Oregon only)				
RO201	8,805	7,664	5,056	66%

[1] Some of RO201 became a part of the Mark O. Hatfield Wilderness. Duplicative acres have been removed.

[2] A portion of RO203 became part of the Badger Creek Wilderness.

[3] Some of RO204 became part of the Badger Creek Wilderness, Mt Hood Wilderness and White River Wilderness.

[4] LSRs RO205 and 206 were largely incorporated into the Salmon-Huckleberry Wilderness.

[5] Portions of LSR RO207 became the Roaring River Wilderness, Clackamas Wilderness and a small portion became part of the Salmon-Huckleberry Wilderness. The bulk of this LSR is adjacent or part of the Roaring River and Salmon-Huckleberry Wilderness. A stringer of this LSR connects this LSR complex with the Mt Jefferson Wilderness. The Clackamas Wilderness is also found in this stringer.

[6] A portion of LSR RO208 became a part of the Clackamas Wilderness.

[7] Portions of LSR RO209 and 210 became part of the Bull of the Woods Wilderness.

Table B-5. Late-successional reserves (LSRs)/wilderness complexes and associated spotted owl habitat, Mt Hood NF and Columbia River Gorge National Scenic Area – 2016.

Map on the following page displays how these complexes have been aggregated.

LSR / Wilderness Complex	Total Acres	Capable Acres	Suitable Acres[3]	% suitable
Mt Hood National Forest				
RO201 / Hatfield Wilderness	116,284	79,253	56,403	71%
RO202, 203, 204 / Badger Creek Wilderness, Mt Hood Wilderness[1], Salmon-Huckleberry Wilderness[1], White River Wilderness	89,991	57,414	41,237	72%
RO205, 206, 207[2], 208 / Salmon-Huckleberry Wilderness[1], Roaring River Wilderness, Clackamas Wilderness[2]	171,087	121,149	87,095	72%
RO209, 210 / Bull of the Woods Wilderness	49,191	32,092	24,501	76%
Mt Hood Wilderness[1]	55,899	14,610	8,694	60%
Mt. Jefferson Wilderness[3]	4,913	964	883	92%
Total	487,365	305,482	219,173	72%
Columbia River Gorge National Scenic Area (Oregon only)				
RO201 / Hatfield Wilderness	33,858	31,179	23,743	76%

1 Only a part of this wilderness is in this complex. The rest is more closely aligned with other LSR/wilderness complex.

2 A portion of RO207 is associated with Salmon-Huckleberry and Roaring River Wildernesses. The rest is adjacent to these with a long stringer attaching it to the Mt Jefferson Wilderness. All of RO207 is reported in this complex.

3 Mt Jefferson Wilderness is more closely aligned with the rest of the wilderness on the Willamette NF. Only the Mt Hood portion of Jefferson Wilderness is shown here.

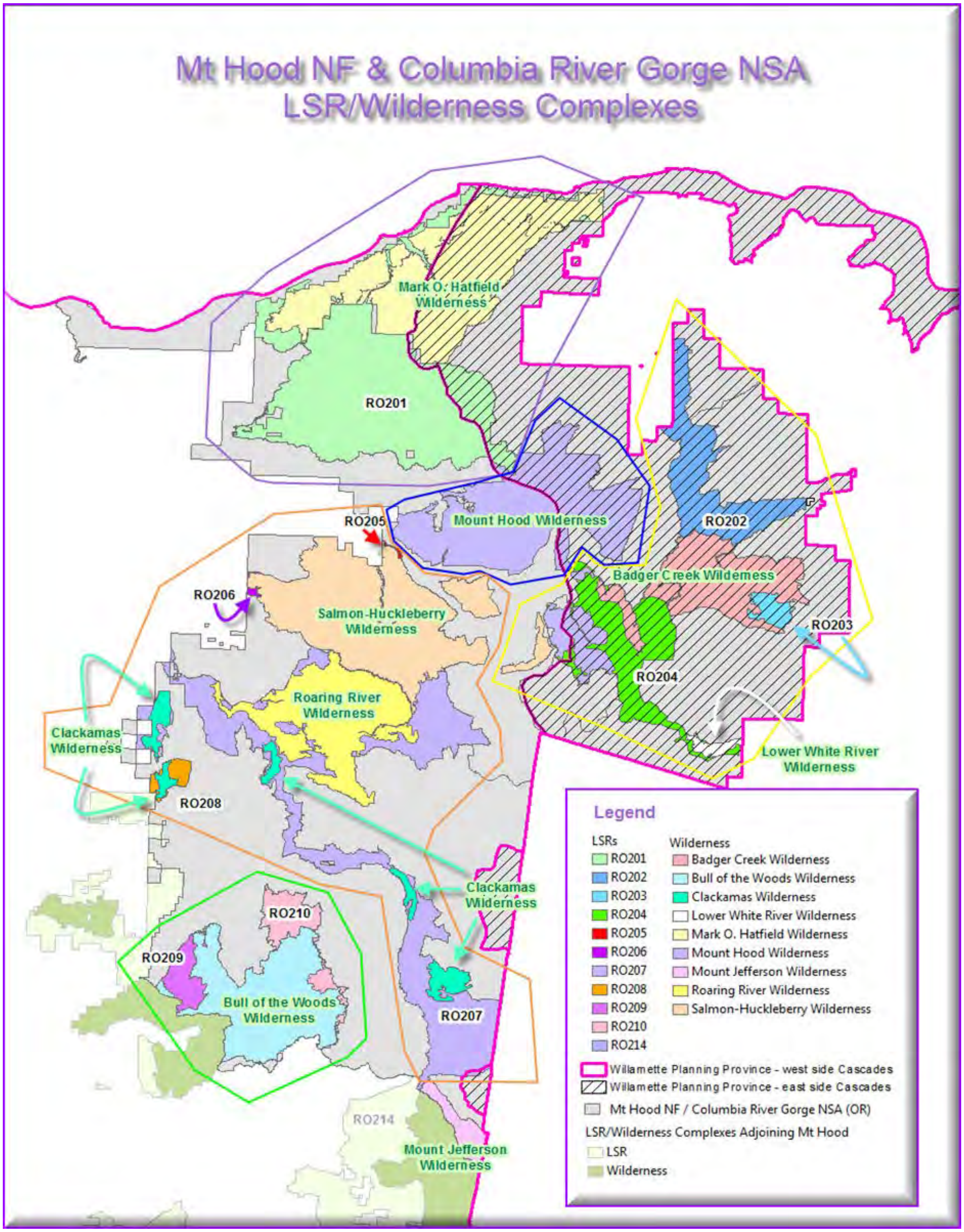


Figure B-1. Mt. Hood and Columbia River Gorge NSA LSR/Wilderness Complexes.

Owl Site Information and Narratives for Known Projects Proposed by the Barlow Ranger District, Mt Hood National Forest

Project Narrative for Willamette Province FY2017 Biological Assessments

District/RA	Project Name or Names	BA (NLAA or LAA)	Cascades (East or West)
Barlow Ranger District	Dog River Pipeline	LAA	East

Effects descriptions should include both beneficial and detrimental effects and their duration. This worksheet prompts for minimum information needed for activities and adversely affected spotted owl territories. Additional information may be required to adequately analyze the effects of an activity.

- **Description of the project.** You will submit a spreadsheet for the project that includes the activity types, treatment methods and units of measure (e.g., acres, trees or number of activities). Provide a concise description of the design criteria, mitigation measures and effects of each treatment so the Level 1 Team can understand why the project has the determination given by the project biologist and so we have the necessary information to write the BA for this project. Refer to the level of project detail in the text of last year's programmatic NLAA and LAA BAs as examples of what information is needed. In submitting your project spreadsheet, combine units with the same effect. Be sure in the description provided below, that it is clear which row(s) of the spreadsheet the descriptions is referring to. For example, if you have 4 different treatments in suitable habitat, it is likely you will need to describe the effects of each one.

For any project that removes dispersal or suitable habitat, identify the number of acres of removal in known or potential owl home ranges and fill out the NSO site spreadsheet for each territory identifying the amount of removal of habitat in each home range and amount of suitable remaining in the core area and home range. The NSO site spreadsheet also needs to be filled out for any activities in a nest patch. If you have questions, contact your Level 1 representative.

The City of The Dalles has an existing Special Use Permit with the Mt. Hood NF that allows maintenance of an existing pipeline that is the water source for the city. The proposed action would replace the existing wooden pipeline with a 24-inch-diameter iron pipe. This new pipeline would parallel the alignment of the existing pipeline which is approximately 3.4 miles long. Existing trees and dead wood would be cut and removed within the 25-foot right of way (10.3 acres over the 3.4 mile long pipeline). The largest 5 percent of these trees will be felled and left on site to provide large down wood.

Currently, half of the 25ft easement is cleared where the existing pipeline was placed 100 years prior. The adjacent 12.5 feet still within the easement is where the trees will be felled to place the new pipeline. The trees along this pipeline have been tagged and cataloged. There are 438 live trees along the 3.4 mile long pipeline ranging in size from 6" to 48" dbh that will be removed. Of these 438 trees, 126 are larger than 24"; 170 are between 12" and 14"; and the remaining trees are 11" and smaller. In addition to the live trees there are 180 standing dead trees most of which are smaller than 11". An excavator would dig a 4-foot deep by 3 to 4-foot wide trench, piling the spoils to either side. The excavator would place the pipe in the trench and then cover the pipe section with gravel or sand and fill in the ditch with the removed spoils. The inlet, discharge structure, and flow measuring facilities would also be replaced.

The pipeline has been surveyed for spotted owls every year since 2012. This is year 5 of surveys to protocol and no owls have been detected during these surveys. A seasonal restriction for cutting trees will be imposed from March 1 to July 15. The District wildlife biologist has inspected all trees to be cut and none of these trees currently provide nesting opportunities in the form of cavities or mistletoe brooms.

- Describe the overall effects of the proposed project (NLAA/LAA). (Effects to LSR, RA32 habitat, critical habitat, and adverse effects to specific owl territories or sites are discussed below.)

The effects of the proposed project are LAA because large trees are being removed and future nesting opportunities would be reduced by removing large trees within suitable habitat along the pipeline.

- Compare effects of treatment vs. no treatment (Effects to LSRs, RA 32 habitat, owls subject to RA10, and effects to critical habitat are discussed below.)
    - Will this treatment improve the overall quality of dispersal, forage or suitable habitat over time? No. Tree removal will cut trees along a 25-foot right-of-way. Half of this right-of-way already has no trees on it where the old pipeline exists. This long narrow road like structure does not change the function of the habitat at the stand scale.
    - Will the treatment accelerate or delay the development of late and old growth characteristics? This project would neither accelerate nor delay the development of these characteristics.
    - How long will it take for treated stands to develop into dispersal and suitable habitat with treatment compared to no-treatment? This project is an easement along a pipeline and the tree removal would be permanent. The intention is to keep the pipeline free of tree growth in the future to prevent damage to the pipe.
    - Additional rationale?

- Is the activity planned in any type of **Late Successional Reserve (LSR)**?

☒ Yes ☐ No

If yes, complete the following. Please address specific effects to LSRs here.

- How will the activity affect **LSR characteristics**? This activity will reduce some large trees and small snags on the landscape. Because this tree removal is within a long narrow corridor, the LSR characteristics at the stand scale would remain the same.

- Is the activity consistent with any associated LSR Assessments, Management Plans, etc.? Please describe: Yes, this project is identified in the Surveyor's Ridge LSR Assessment as a project that would be implemented within this LSR.
- Explain the rationale for conducting the activity, especially if detrimental. Include rationale and/or benefits of treatments that mitigate or improve stands based on "forest health" or "ecological forestry." The existing municipal water diversion pipeline has been in place for over 100 years. The leaking wooden pipeline is in critical need for replacement.

- Is the activity planned in **Recovery Action 32 habitat**?

☒ Yes ☐ No

If yes, complete the following.

- How will the activity affect RA 32 habitat? Explain the need and rationale for conducting the activity, especially if effects are detrimental. A small portion (approx. 0.5 miles or 1.5 acres) of the project is in RA 32 habitat. This project will not change the function of this habitat.

- Is the activity expected to disrupt owls, remove suitable or dispersal habitat, or have activities in a nest patch within a known or potential site territory?

☐ Yes ☒ No

If "yes", spotted owl sites should also be entered into the NSO sites spreadsheet whether the action is LAA or NLAA.

If yes, complete the following.

- For all known or proposed owl sites that may be adversely affected, provide the following information.
  - MSNO or other owl site identifier.
  - Identify the priority of the owl site under RA 10. Use ranking 1-10 identified in new appendix.
  - Describe the survey history regarding occupancy of the owl site (e.g., resident single, pair, unoccupied, unknown) and the nesting/reproductive status (e.g., nesting, non-nesting, unknown). Include when surveys were completed and if surveys were completed to protocol standards. If surveys have been recent, include the last five years. If surveys are historical (greater than 10 years ago), include the survey year that the activity center is based on.

The pipeline has been surveyed for spotted owls every year since 2012. This is year 5 of surveys and no owls have been detected during these surveys. Because surveys only took place along the proposed pipeline and they did not include the 1.2 mile buffer from the pipeline, it is possible that the pipeline falls within a core area or home range because owls may not have been detected at this distance. If a nest patch were within the pipeline corridor however, the owls would have been detected during surveys, but none were detected.

- Describe the site condition of the owl site.
  - Nest Patch: Type of habitat, amount, and percentage within the nest patch both currently and after treatment.
  - Core Area: Amount and percentage of suitable habitat in the core area currently and after treatment.
  - Nest Patch: Amount and percentage of suitable habitat in the home range currently and after treatment.
- If LAA effects are due to **disruption**, describe the source of disruption, time of year and how many seasons disruption is expected to occur.
- If LAA effects are due to **general habitat modification** (e.g., removal or downgrade of suitable habitat), describe the type of effects and their duration.

The habitat modification effects of the proposed project are LAA because large trees are being removed and future nesting opportunities would be reduced by removing large trees within suitable habitat along the pipeline.

- If LAA effects will occur to **known or potential owl territories**, describe these effects.
  - Explain the rationale for all LAA effects to the territory, including the potential for harm.

.Include any considerations relevant to the ability of a territory to provide for pair occupation and nesting/reproduction.

- For dispersal habitat removed, describe why the action is LAA or NLAA.

The portion of this project that removes trees was considered NLAA because the number of trees removed (219) spread over 1.4 miles (portion of the project in dispersal) would not impact the ability of owls to disperse across the landscape or even at the stand scale.

- Is the activity planned in **spotted owl critical habitat**?

☒ Yes ☐ No

If yes, complete the following:

- Describe the need and rationale for implementing the activity, and the specific treatments, in critical habitat. 2.9 miles of the 3.4 pipeline are within critical habitat. The existing municipal water diversion pipeline has been in place for over 100 years. The leaking wooden pipeline is in critical need for replacement to maintain water to the City of The Dalles.

- Describe the effects to critical habitat (NLAA, LAA or NE [if activity is disruption-only]). LAA for removal of large trees (future nest trees) and some snags and future recruitment of large down wood.
- Address the effects of the activity(s) on PBFs (e.g., large trees, canopy complexity, snags and down logs; nesting, roosting, forage and dispersal habitats). Compare the effects of treatment vs. no treatment on PBF and habitat trajectories over a similar timeframe.
- How long would the attainment of suitable habitat be delayed or accelerated by the activity?

The attainment of suitable habitat would not be impacted at the stand scale. Some large trees and snags would be removed, reducing future nesting habitat and some prey habitat. The largest 5% of cut trees would be left on-site for large down wood.

- Would there be sufficient suitable habitat in the immediate area after treatment to support a known or potential site? Yes. Suitable habitat would be maintained at the same levels after project completion.
- Discuss the effects of activities not located in critical habitat that may adversely affect owl territory(s) where the owl center ***is*** located in critical habitat. All owl territory habitat percentages will remain unchanged.
- Address special management considerations specific to the critical habitat unit.

ECN 7 East Cascades North

1. Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands this recommendation applies to all land-use allocations (see also Thomas et al. 2006, pp. 284–285). *How does this activity meet this special management consideration?* Completion of the pipeline replacement would not impact habitat at the stand scale. Individual trees would be removed along a 12.5 foot wide corridor (adjacent to an existing 12.5’ open corridor) and would not impact the function of habitat in these stands.
2. Emphasize vegetation management treatments outside of northern spotted owl territories or highly suitable habitat. *How does this activity meet this special management consideration?* This is not a vegetation management treatment but rather a required replacement of a leaking wooden pipe that has conveyed municipal water to the City of The Dalles since 1870.
3. Design and implement restoration treatments at the landscape level. *How does this activity meet this special management consideration?* This is not a restoration treatment project.
4. Retain and restore key structural components, including large and old trees, large snags, and downed logs. *How does this activity meet this special management consideration?* N/A
5. Retain and restore heterogeneity within stands. How does this activity meet this special management consideration? N/A

6. Retain and restore heterogeneity among stands. How does this activity meet this special management consideration? N/A
7. Consider vegetation management objectives when managing wildfires, where appropriate. *How does this activity meet this special management consideration?* This project does not propose to manage wildfires.

APPENDIX C: Willamette National Forest

Unit Specific Data

The following Willamette National Forest tables of the proposed action for spotted owls and their critical habitat are from the BA (FS 2016, pp. 120-178).

There are no projects proposed by the Detroit or the Sweet Home Ranger Districts in this consultation.

Only the McKenzie and Middle Fork Ranger Districts have proposed projects for this consultation.

Table C-1. Proposed projects for the Willamette National Forest during FY 2016/17 which may adversely affect the spotted owl. Only the McKenzie River and Middle Fork Ranger Districts have proposed projects for this consultation.

McKenzie River Ranger District

Project Name	Proposed Activity	Acres	Land Use Allocation	Current Habitat	Habitat Functionality Change	Effect-Hab Mod	Effect-Disruption	2012 CHU Subunit	CHU2012 acres	Effect to 2012 CHU	Known Owl Sites NOT Adversely Affected by Treatment (NLAA) (List)	Known Owl Sites Adversely Affected by Treatment (LAA) (List)	Potential Owl Sites Adversely Affected by Treatment (LAA) (List)	Activity in Nest Patch (300 meters) - yes/no	Acres in RA 32 Habitat
Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	21	Matrix	Suitable	Suitable downgraded to dispersal	LAA	NE	WCS 3	21	LAA		123		no	21
Fish Lake Thin and Danger Tree Removal	Harvest Habitat Downgrade	18	Admin withdrawn	Suitable	Suitable downgraded to dispersal	LAA	NE	WCS 3	18	LAA		123		no	15
Fish Lake Thin and Danger Tree Removal	Harvest Habitat Maintain	11	Admin withdrawn	Non-habitat	Non-habitat	NE	NE							no	0
Knoll Thin	Harvest Habitat Maintain	12	Matrix	Dispersal	Habitat maintained	NLAA	NLAA-outside disruption distance/time	WCS 3	12	NLAA	2449, 0829			no	0
Knoll Thin	Harvest Habitat Downgrade	55	Matrix	Suitable	Suitable downgraded to dispersal	LAA	NLAA-outside disruption distance/time	WCS 3	55	LAA		2449, 0829		no	0
410 Rootrot Removal Pocket	Harvest Habitat Remove	1	Matrix	Suitable	Habitat removed	LAA	NLAA-outside disruption distance/time		0			2825, 0835		no	0
410 Rootrot Removal Pocket	Harvest Habitat Remove	0.5	Matrix	Dispersal	Habitat removed	NLAA	NLAA-outside disruption distance/time		0		2825, 0835			no	0

Project Name	Proposed Activity	Acres	Land Use Allocation	Current Habitat	Habitat Functionality Change	Effect-Hab Mod	Effect-Disruption	2012 CHU Subunit	CHU2012 acres	Effect to 2012 CHU	Known Owl Sites NOT Adversely Affected by Treatment (NLAA) (List)	Known Owl Sites Adversely Affected by Treatment (LAA) (List)	Potential Owl Sites Adversely Affected by Treatment (LAA) (List)	Activity in Nest Patch (300 meters) - yes/no	Acres in RA 32 Habitat
410 Rootrot Removal Pocket	Harvest Habitat Maintain	4.5	Matrix	Non-habitat	Non-habitat	NE	NLAA-outside disruption distance/time		0					no	0
Tamolitch Pools Trailhead Improvement	Harvest Habitat Remove	0.5	Cong withdrawn	Suitable	Habitat removed	LAA	NE	WCS 3	0.5	LAA		0822, 2838		no	0
Tamolitch Pools Trailhead Improvement	Harvest Habitat Remove	1	Cong withdrawn	Non-habitat	Non-habitat	NLAA	NE	WCS 3	1.0	NLAA	0822, 2838			no	0
Lower 19 Road Hazardous Fuels	Fuels Treatment	252	AMA	Suitable	Habitat maintained	LAA	NLAA-outside disruption distance/time		0					no	190
Lower 19 Road Hazardous Fuels	Fuels Treatment	8	AMA	Dispersal	Habitat maintained	NLAA	NLAA-outside disruption distance/time		0					no	0
Lower 19 Road Hazardous Fuels	Fuels Treatment	15	AMA	Non-habitat	Non-habitat	NE	NLAA-outside disruption distance/time		0					no	0

Middle Fork Ranger District

Project Name	Proposed Activity	Acres	Land Use Allocation	LSR Number or category	Current Habitat	Habitat Functionality Change	Effect-Hab Mod	Effect-Disruption	2012 CHU Subunit	CHU2012 acres	Effect to 2012 CHU	Known Owl Sites Adversely Affected by Treatment (LAA) (List)	Activity in Nest Patch (300 meters) - yes/no	Acres in RA 32 Habitat
Carpet Hill Quarry	Harvest Habitat Remove	2	Matrix		Suitable	Habitat removed	LAA	NLAA-outside disruption distance/time	WCS 4	2	LAA	2896	no	0
Deception Quarry	Harvest Habitat Remove	2	LSR	RO222	Suitable	Habitat removed	LAA	NLAA-outside disruption distance/time	WCS 4	2	LAA		no	0

Table C- 2. Status of the spotted owl and its habitat– Willamette NF.

Willamette National Forest	Total Acres	Protected[1]		Unprotected[2]		Non Forest Service land within administrative unit boundary	
		Total Acres	% of Total	Total Acres	% of Total	Total Acres	% of Total
Acres within Boundary[4]	1,799,325	854,349	47%	944,977[3]	53%	111,378[3]	6%
Acres of Ownership[5]	1,687,947	854,349	51%	833,599	49%		
Suitable Habitat – Capable Acres[6]	1,420,449	684,447	48%	735,613	52%		
Suitable Habitat – Current Acres[7]	806,274	439,359	54%	366,916	46%		

Known Spotted Owl Sites	Number of Sites	Protected	% of Total	Unprotected	% of Total
Spotted Owl Sites[8]	618	452	73%	166	27%
Spotted Owl Sites with ≥ 50% suitable habitat in the core area	430	326	76%	104	24%
Spotted Owl Sites with ≥ 40% suitable habitat in the provincial home range	457	343	75%	114	25%
Spotted owl sites with ≥ 50% suitable habitat in the core area AND ≥ 40% suitable habitat in the provincial home range	394	302	77%	92	23%

1 Acres in this column are comprised of: Late Successional Reserves (LSR) and associated Riparian Reserves, 100-acre LSRs, Congressionally Withdrawn Areas.

2 Acres in this column are comprised of: Matrix, Adaptive Management Areas, and Administratively Withdrawn Areas including associated Riparian Reserves. Administratively Withdrawn Areas are included in the unprotected column because technically these areas are not designed to provide spotted owl habitat but rather to serve some other function such as "recreation and visual areas, back country, and other areas where management emphasis precludes scheduled timber harvest" (USDA, and USDI 1994a, p. A-4). The administrative land and resource management plan may protect and/or reduce the likelihood that spotted owl habitat located within Administratively

Withdrawn Areas would be modified.

[3] Non-federal land is included in the Unprotected columns in this row only.

[4] Acres in this row include both federal and non-federal lands within administrative boundaries. These acres are derived from corporate GIS data, which were last updated in 2013. **All non-BLM or non-Forest Service acres are considered "unprotected."**

[5] Acres shown in this row and all subsequent rows show only federal lands in the Willamette Planning Province.

[6] Federal land that is capable of producing suitable spotted owl habitat, regardless of its current habitat.

[7] Suitable habitat is defined as nesting, roosting, and foraging habitat.

[8] Spotted owl sites represent pairs or resident singles 1990-2013. The Land Use Allocation of the site center determines whether it is shown in the protected or unprotected columns.

Data has been updated to reflect changes due to past harvest, land exchanges, GIS updates or new locations of spotted owl sites.

Note: Difference in base values from previous consultation documents in this and the two following tables are due to updated GIS (Geographic Information Systems) layers. For consistency with the current layers, the tables were recalculated with current GIS information.

Table C-3. Late-successional reserves and associated spotted owl habitat, Willamette NF – FY2016.

Late-Successional Reserve	Total Acres[1]	Capable Acres	Suitable Acres	% suitable of Capable
RO209[2]	3,102	2,797	950	34%
RO213	57,167	55,218	36,460	66%
RO214	40,015	38,013	19,815	52%
RO215	27,822	25,558	16,610	65%
RO216	604	602	461	77%
RO217	9,860	9,372	8,057	86%
RO218	26,241	24,626	17,076	69%
RO219	66,023	65,344	35,855	55%
RO220	51,391	48,559	29,881	62%
RO221	16,612	15,965	10,313	65%
RO222	92,840	90,272	56,602	63%
Total	319,677	376,326	232,080	62%

[1] Includes only federal land within late successional reserves. Any overlapping wilderness acres have been removed from this table and are shown in the following table.

[2] Opal Creek Wilderness is coincident with RO209 over a large portion of the LSR. In this table, Opal Creek Wilderness acres are not listed. See the following table for a combination of RO209 and Opal Creek Wilderness acres.

Table C-4. Late-successional reserves (LSRs)/wilderness complexes and associated spotted owl habitat, Willamette NF – FY2016.

LSR / Wilderness Complex	Total Acres	Capable Acres	Suitable Acres[3]	% suitable of Capable
RO209/Opal Creek Wilderness	25,590	20,152	12,039	60%
RO213/Middle Santiam Wilderness	65,866	63,535	44,505	70%
RO214/Mt. Jefferson Wilderness	111,646	82,941	26,529	32%
RO215/Menagerie Wilderness	32,740	30,417	21,369	70%
RO218/Three Sisters Wilderness	212,972	159,769	97,019	61%
RO220/Waldo Lake Wilderness	85,540	79,409	55,338	70%
RO221/Diamond Peak Wilderness	35,548	31,045	24,723	80%
Mt. Washington Wilderness	40,223	17,033	3,994	23%
Total	610,125	484,301	285,516	59%

Table C-5. Acres of critical habitat by subunit and habitat type on federal lands in the Willamette National Forest.

Critical Habitat Subunit	Suitable Habitat	Dispersal Habitat	Non-habitat (but forest capable)
Willamette National Forest			
WCS-2	15	12	0
WCS-3	184,954	60,499	46,400
WCS-4	234,697	77,082	63,599
WCS-5	62	30	32

This table has been adjusted by previously consulted on actions that would remove suitable or dispersal habitat in 2012 critical habitat or actions that would downgrade suitable habitat to dispersal habitat in 2012 critical habitat.

Owl Site Information and Narratives for Known Projects Proposed by the McKenzie River Ranger District, Willamette National Forest

Project Narrative for Willamette Province FY2017 Biological Assessments

District/RA	Project Name or Names	BA (NLAA or LAA)	Cascades (East or West)
McKenzie River Ranger District	Fish Lake Thin and Danger Tree Removal	LAA	West

Effects descriptions should include both beneficial and detrimental effects and their duration. This worksheet prompts for minimum information needed for activities and adversely affected spotted owl territories. Additional information may be required to adequately analyze the effects of an activity.

- **Description of the project.** You will submit a spreadsheet for the project that includes the activity types, treatment methods and units of measure (e.g., acres, trees or number of activities). Provide a concise description of the design criteria, mitigation measures and effects of each treatment so the Level 1 Team can understand why the project has the determination given by the project biologist and so we have the necessary information to write the BA for this project. Refer to the level of project detail in the text of last year's programmatic NLAA and LAA BAs as examples of what information is needed. In submitting your project spreadsheet, combine units with the same effect. Be sure in the description provided below, that it is clear which row(s) of the spreadsheet the descriptions are referring to. For example, if you have 4 different treatments in suitable habitat, it is likely you will need to describe the effects of each one.

For any project that removes dispersal or suitable habitat, identify the number of acres of removal in known or potential owl home ranges and fill out the NSO site spreadsheet for each territory identifying the amount of removal of habitat in each home range and amount of suitable remaining in the core area and home range. The NSO site spreadsheet also needs to be filled out for any activities in a nest patch. If you have questions, contact your Level 1 representative.

Fill in the items below.

- Describe the overall effects of the proposed project (NLAA/LAA). (Effects to LSR, RA32 habitat, critical habitat, and adverse effects to specific owl territories or sites are discussed below.)

The McKenzie River Ranger District is proposing to treat ~50 acres located in three stands. The stands vary from 21 acres (Unit #1), 18 acres (Unit #2), and 11 acres (Unit #3). Units #1 and #2 are approximately 60-120 years old based on the dominant cohort. However, based on both increment bore sampling and estimation of the larger trees and estimation based on similar stands, Units 1 and 2 are composed of two cohorts. The older cohort has a density of about 23 legacy trees per acre that are 180+ years old (DBH 38"+) and this project will retain a majority of these larger trees. The younger cohort consists of about 155 trees per acre that have an average stand age of 60-100 (DBH 16-28"+). The stand as a whole average 60-120 years old and this project will remove mostly intermediate and co-dominate trees to provide more space between the canopies. Douglas fir is the primary overstory species with a minor component of hemlock. Unit 3 consists of about 11 acres that have an open overstory and thus does not qualify as suitable or dispersal habitat.

Units 1 and 2 qualify as an RA32 stand based on the older cohort of trees. This older cohort would be retained, except for individual danger trees around the Fish Lake buildings. Following thinning, treatment-created fuels or natural fuel accumulations will be reduced through various methods such as hand and machine piling and pile burning to reduce the fire hazard.

Associated activities would consist of road maintenance that includes rocking, brushing, blading, and rock compaction. Temporary road construction would not exceed 0.5 miles and there would be no permanent road construction, reconstruction, or culvert replacement. The stands have slopes ranging from 5-30 percent and yarding would be ground-based. A stream on the west of these stands will be buffered from management (Figure 1).

The purpose of this project is to reduce the abundance of ladder fuels and canopy densities adjacent to Fish Lake Remount depot that is located within the Wildland Urban Interface (WUI), and improve the safety of human forest users. The thinning treatment would maintain an average stand canopy cover of at least 40 percent and 40-45 residual trees per acre. This project will leave primarily the largest and healthiest trees with the largest crowns. The desired tree spacing will vary from 18-36 feet, providing a more open environment that is more conducive to fire suppression. Thinning or spacing out the canopies within the three units would reduce fire behavior in a wildfire event. Trees to be removed would range mostly within the 16-24 inch diameter range. Understory treatments include removal of smaller tree size classes down to 7” diameter. While this would temporarily open the understory for ~5-10 years, the increased sunlight would also promote the regrowth of the understory stand structure.

<u>Suitable habitat treatments:</u> This project would downgrade about 39 acres of suitable owl habitat with a post-treatment habitat type of dispersal. Overall effects of this project are judged to be LAA. The final overstory canopy in suitable owl habitat after tree removal would be maintained at over 40%. Hazardous snags and trees near the Fish Lake Remount Depot buildings, access roads or other high use areas that pose a danger would be felled and removed. Other snags that occur outside the hazardous distance from the buildings would be protected if possible to maintain the integrity of the dead wood component of these stands. Harvest – Habitat Downgrade would modify spotted owl suitable habitat to the extent that it no longer serves the function of nesting, roosting and foraging. It may, however, continue to function as dispersal habitat. Removing components of the understory down to 7” dbh would open the stand further and reduce the habitat quality for spotted owl prey species such as woodrats.

Since this activity would remove suitable habitat by downgrading it to dispersal, Harvest – Habitat Downgrade ***may affect, and is likely to adversely affect spotted owls*** directly and indirectly by impairing the breeding or forage opportunities of resident spotted owls.

<u>Non-habitat treatments</u>: Unit 3 consists of about 11 acres that have an open overstory and thus do not qualify as suitable or dispersal habitat.

Suitable and non-habitat treatments: No existing down wood would be removed from the stands. Snags that are hazards to the Fish Lake structures would be felled. Those snags that do not pose a safety concern would be retained to support habitat for the northern spotted owl preybase as well as primary cavity excavators. If falling is required, most snags would be left on site as downed wood if they do not pose a fire risk due to a large accumulation of dead wood near structures. Existing large down woody material would be maintained for habitat diversity, and full tree lengths would be retained as much as possible. The amount of down wood left would meet or exceed Forest Plan standards and guidelines.

Untreated skips may or may not be designed in the treatment units. Additional unharvested areas may be delineated to protect survey and manage species, special habitat areas, and other resource considerations.

Compare effects of treatment vs. no treatment (Effects to LSRs, RA 32 habitat, owls subject to RA10, and effects to critical habitat are discussed below.)

- Will this treatment improve the overall quality of dispersal, forage or suitable habitat over time?

The Fish Lake Project treatments are not expected to improve the overall quality of the suitable habitat stands (Units 1 and 2) over time. Trees within the non-habitat stand (Unit 3) will be released and growth will be accelerated in this area which consists of small tree islands surrounding buildings and a parking area, and an edge of younger trees on the edge of an older stand. The smaller trees on the stand edge would develop into dispersal and suitable owl habitat more quickly with the proposed thinning treatment.

- Will the treatment accelerate or delay the development of late and old growth characteristics?

The small tree islands and edges adjacent to older stands in unit 3 would show accelerated tree growth since there would be more open space to grow under the canopy, which would result in more rapid development of late and old growth characteristics. Units 1 and 2 already show late and old growth characteristics and opening the canopy by thinning would downgrade these stands. If these stands are thinned to 40% canopy cover, they would be expected to recover to 60% canopy cover and suitable habitat characteristics in about 15-20 years. The trees in this area are slow growing due to higher elevation and volcanic soils.

How long will it take for treated stands to develop into dispersal and suitable habitat with treatment compared to no-treatment?

The suitable habitat stands (1 and 2) would be thinned to no less than 40% canopy cover and would remain in a dispersal habitat condition, developing back into suitable habitat in 15-20 years. Snag habitat would be somewhat reduced within about 300 feet of the surrounding Fish Lake Remount Depot structures. The scattered large snags in the interior of these stands would remain unless they are determined to be a hazard to the logging operation.

The non-habitat stand (unit 3) would develop into dispersal and suitable habitat on the northern most edge where it is connected to unit 2 within 10 years once the smaller trees increase diameters and 40% canopy cover is achieved.

- Additional rationale?

- Is the activity planned in any type of **Late Successional Reserve (LSR)**?

☐ Yes ☒ No

If yes, complete the following. Please address specific effects to LSRs here.

- How will the activity affect **LSR characteristics**?
- Is the activity consistent with any associated LSR Assessments, Management Plans, etc.? Please describe:
- Explain the rationale for conducting the activity, especially if detrimental. Include rationale and/or benefits of treatments that mitigate or improve stands based on "forest health" or "ecological forestry."

- Is the activity planned in **Recovery Action 32 habitat**?

☒ Yes ☐ No

If yes, complete the following.

- How will the activity affect RA 32 habitat? Explain the need and rationale for conducting the activity, especially if effects are detrimental.

RA32 habitat would be compromised due to the thinning and hazardous snag removal treatments. The rationale for this project is to protect the historic Fish Lake Remount Depot structures, and provide for the safety of forest users in that area.

- Is the activity expected to disrupt owls, remove suitable or dispersal habitat, or have activities in a nest patch within a known or potential site territory?

☐ Yes ☒ No, this project would downgrade suitable owl habitat but not remove it.

If "yes", spotted owl sites should also be entered into the NSO_sites spreadsheet whether the action is LAA or NLAA.

If yes, complete the following.

1. For all known or proposed owl sites that may be adversely affected, provide the following information.

2. MSNO or other owl site identifier. 0123

- Identify the priority of the owl site under RA 10. Use ranking 1-10 identified in new appendix.

MSNO 0123-9

- Describe the survey history regarding occupancy of the owl site (e.g., resident single, pair, unoccupied, unknown) and the nesting/reproductive status (e.g., nesting, non-nesting, unknown). Include when surveys were completed and if surveys were completed to protocol standards. If surveys have been recent, include the last five years. If surveys are historical (greater than 10 years ago), include the survey year that the activity center is based on.

The adjacent activity center MSNO 0123 been annually surveyed by the Oregon Cooperative Wildlife Research Unit as part of the spotted owl demography study since the early 1990s, and meets protocol standards. This activity center is based on a 2008 nesting pair location. A day resident single was found in 2009, and there have been no spotted owl detections since then. Thus, this site now meets the definition of "unoccupied."

Historically, there were many other spotted owl detections in the area in the 1980s through 2009.

- Describe the site condition of the owl site.
  - Nest Patch: Type of habitat, amount, and percentage within the nest patch both currently and after treatment.

No nest patch treatments are planned.

  - Core Area: Amount and percentage of suitable habitat in the core area currently and after treatment.
  - Home Range: Amount and percentage of suitable habitat in the home range currently and after treatment.

MSNO 0123	Current Acres/%	After Treatment Acres/%
Core Area Suitable Habitat	265/53%	262/52%
Home Range Suitable Habitat	744/26%	705/24%

- If LAA effects are due to **disruption**, describe the source of disruption, time of year and how many seasons disruption is expected to occur.

No disruption is planned.

- If LAA effects are due to **general habitat modification** (e.g., removal or downgrade of suitable habitat), describe the type of effects and their duration.

See above

- If LAA effects will occur to **known or potential owl territories**, describe these effects.
    - o Explain the rationale for all LAA effects to the territory, including the potential for harm.

MSNO 0123 already has very low habitat levels within the home range at 744 acres of suitable habitat or 26% which is below the threshold. About 890 acres within the home range radius consist of Fish Lake, Lava Lake, and lava with very small trees to the east. The Fish Lake project would downgrading an additional ~39 acres of suitable owl habitat to dispersal habitat with units 1 and 2. These units are located adjacent to the non-habitat area provided by Fish Lake and the lava to the east. There is a low potential for harm to owls because the site is not occupied based on survey information.

- o Include any considerations relevant to the ability of a territory to provide for pair occupation and nesting/reproduction.

For dispersal habitat removed, describe why the action is LAA or NLAA. Is the activity planned in **spotted owl critical habitat**?

☒ Yes ☐ No

If yes, complete the following:

- Describe the need and rationale for implementing the activity, and the specific treatments, in critical habitat.

The purpose of this project is to reduce the abundance of ladder fuels and canopy densities adjacent to the historic Fish Lake Remount Depot that is located within the Wildland Urban Interface (WUI), and improve the safety of human forest users. Units 1 and 2 are located within critical habitat unit WCS 3. Unit 3 is not within critical habitat.

- Describe the effects to critical habitat (NLAA, LAA or NE [if activity is disruption-only]).

Downgrade of suitable habitat would modify spotted owl suitable habitat to the extent that it no longer serves the function of nesting, roosting and foraging. It may, however, continue to function as dispersal habitat. Since this activity would remove suitable habitat by downgrading it to dispersal, HH Downgrade may affect, and is likely to adversely affect spotted owl critical habitat either directly or indirectly by impairing the breeding or forage opportunities for resident spotted owls and reducing roosting opportunities for dispersing spotted owls. Effects to critical habitat from this project are expected to be LAA due to the downgrade of 39 acres of suitable owl habitat.

Address the effects of the activity(s) on PBFs (e.g., large trees, canopy complexity, snags and down logs; nesting, roosting, forage and dispersal habitats). Compare the effects of treatment vs. no treatment on PBF and habitat trajectories over a similar timeframe.

- PBF 1 is the forest types that support NSOs. This criterion was used to identify critical habitat affected by the project. Because the Fish Lake Thin and Danger Tree Project would not result in a change in forest type, there is no effect to this PBF.

- PBFs 2, 3, and 4 (nesting/roosting, foraging, and dispersal habitat) were specifically considered with respect to the proposed action to determine if they were removed, reduced, maintained or enhanced at a stand level. The assessment considered both short-term (0-15 years) and long-term (16-100 years) effects with respect to these PBFs. For early seral stands of capable (i.e. PBF 1) habitat that currently do not provide PBFs 2-4, the analysis of impacts had both a temporal scale (would the actions would delay or accelerate the development of the PBFs in the stand following treatment) and a qualitative scale (would the future habitat be better or worse with respect to the PBFs as a result of the treatment).

- The Fish Lake Thin and Danger Tree Removal Project would downgrade about 39 acres of suitable owl habitat in critical habitat and thus affect PBFs 2, 3 and 4 at the stand scale. Some large trees that pose hazards to the Fish Lake structures would be removed. Thinning the stands and removing of selected snags would affect the spotted owl preybase habitat capability and thus further reduce the local habitat quality for spotted owls. Dispersal habitat would continue to be maintained. Some of the remaining smaller trees would be released and thus their size and canopy complexity would be improved within several years. Some snags may be lost if they pose a hazard to the operation. Any impacts to PBFs 2, 3 and 4 should not be significant or adverse at the subunit critical habitat scale.
- How long would the attainment of suitable habitat be delayed or accelerated by the activity?

Suitable habitat attainment would be delayed by about 15-20 years as described above.

- Would there be sufficient suitable habitat in the immediate area after treatment to support a known or potential site?

With the adjacency to Fish and Lava Lakes, as well as the lava fields to the east, suitable habitat levels are at low levels in the immediate area to support the known site.

- Discuss the effects of activities not located in critical habitat that may adversely affect owl territory(s) where the owl center ***is*** located in critical habitat.

Unit 1 and 2 of the Fish Lake Project is located in critical habitat, as well as the nearby owl activity center (MSNO 0123).

- Address special management considerations specific to the critical habitat unit.

WCS 3 West Cascades/Coast Ranges of Oregon and Washington

  - Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands this recommendation applies to all land-use allocations (see also Thomas *et al.* 2006, pp. 284–285). *How does this activity meet this special management consideration?*

RA 32 habitat has not yet been field reviewed and mapped for this project. About 36 acres in units 1 and 2 are judged to meet this criterion. District fire managers are recommending treating the high levels of naturally occurring hazardous fuels surrounding the Fish Lake Remount Depot. The main goal of this project is to protect the Fish Lake structures with a broad buffer zone from the north. The treatments could help prevent a catastrophic wildfire in the area if a fire were started by visitors or residents at the Fish Lake Remount Depot because such a fire start would be easier to contain from spreading into the surrounding forests after fuel treatment Fuels concentrations in this area are relatively high.

  - Management emphasis needs to be placed on meeting northern spotted owl recovery goals and long-term ecosystem restoration and conservation. When there is a conflict between these goals, actions that would disturb or remove the essential physical or biological features of northern spotted owl critical habitat need to be minimized and reconciled with long-term ecosystem restoration goals. *How does this activity meet this special management consideration?*

This project would modify about 39 acres in suitable owl habitat and the final overstory canopy would be retained above 40% Treatments would leave the largest trees intact as well as most snags that do not pose a hazard to the Fish Lake structures. Understory stand structure would be diversified which could benefit the long-term stand structure.

  - Continue to manage for large, continuous blocks of late-successional forest. *How does this activity meet this special management consideration?*

No large, continuous blocks of late-successional forest would be removed with this project. The existing stands in units 1 and 2 where there is currently suitable owl habitat would be maintained at 40% canopy levels and downgraded to dispersal habitat. The project area is located adjacent to highway 126 on the east where a large lava field is located. The proposed Fish Lake treatment stands are on the very edge of a large continuous block of late-successional forest.

- In areas that are not currently late-seral forest or high-value habitat and where more traditional forest management might be conducted (e.g., matrix), these activities should consider applying ecological forestry prescriptions. Some examples that could be utilized include Franklin et al. (2002, pp. 417–421; 2007, entire), Kerr (2012), Drever et al. (2006, entire), Johnson and Franklin (2009, pp. 39–41), Swanson et al. (2010, entire), and others cited in the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, pp. III-14, III-17 to III-19). *Does the activity apply ecological forestry prescriptions?*

☒ Yes ☐ No

If yes, describe what measures will be used (e.g., % skips, dead wood creation, leaving legacy features, releasing hardwoods, diversity thinning prescription, etc.).

The thinning treatment would maintain an average stand canopy cover of 40 percent and 40-45 residual trees per acre. This project would leave primarily the largest and healthiest trees with the largest crowns. Trees to be removed would range mostly within the 16-24 inch diameter range. Understory treatments include removal of smaller tree size classes down to 7” diameter. While this would temporarily open the understory for ~5-10 years, the increased sunlight would also promote growth of the understory stand structure.

A ~20 acre no-treatment skip has been mapped as part of this project (Figure 1). Untreated skips may or may not be designed in the treatment units. Additional unharvested areas may be delineated to protect survey and manage species, special habitat areas, and other resource considerations.

Snags would be removed where they are hazards to the buildings at the Fish Lake Remount Depot. Additional snags may also be felled if they pose a hazard to the thinning operation. If falling is required, most snags would be left on site as downed wood if they do not pose a fire risk due to a large accumulation of dead wood near structures. Existing large down woody material would be maintained for habitat diversity, and full tree lengths would be retained as much as possible. The amount of down wood left would meet or exceed Forest Plan standards and guidelines of 240 lineal feet/acre and is recommended to be at 300 lineal feet/acre.

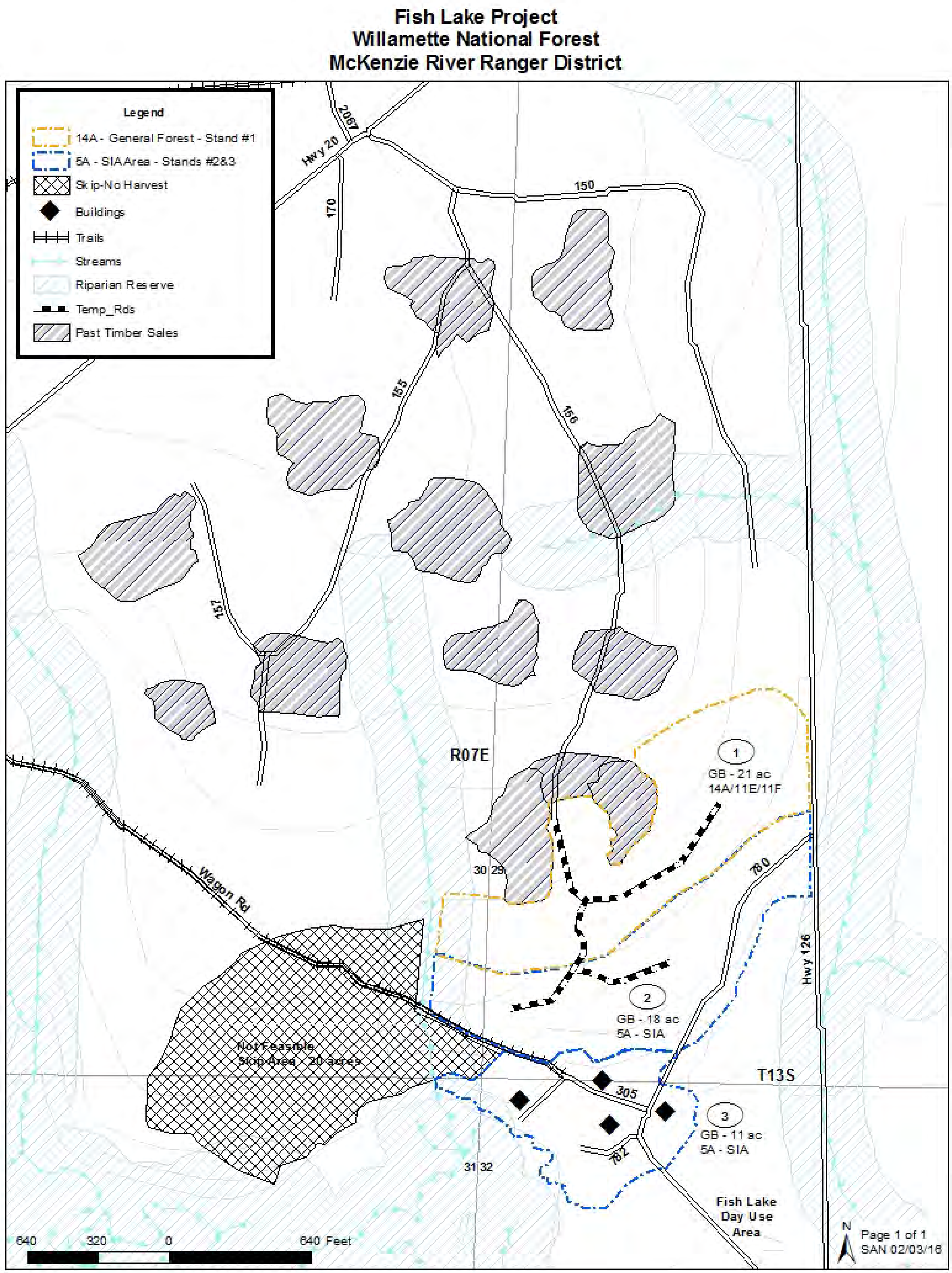

Fish Lake Project
Willamette National Forest
McKenzie River Ranger District
Legend
14A - General Forest - Stand #1
5A - SIA Area - Stands #2&3
Skip-No Harvest
Buildings
Trails
Streams
Riparian Reserve
Temp_Rds
Past Timber Sales
2067
Hwy 20
170
150
155
156
157
R07E
1
GB - 21 ac
14A/11E/11F
30 29
780
Wagon Rd
2
GB - 18 ac
5A - SIA
Not Feasible
Skip Area - 20 acres
T13S
305
3
GB - 11 ac
5A - SIA
782
31 32
Hwy 126
Fish Lake
Day Use
Area
640 320 0 640 Feet
Page 1 of 1
SAN 02/03/16

Figure 1.

Project Narrative for Willamette Province FY2017 Biological Assessments

District/RA	Project Name or Names	BA (NLAA or LAA)	Cascades (East or West)
McKenzie River Ranger District	Knoll Thin	LAA	West

Effects descriptions should include both beneficial and detrimental effects and their duration. This worksheet prompts for minimum information needed for activities and adversely affected spotted owl territories. Additional information may be required to adequately analyze the effects of an activity.

- **Description of the project.** You will submit a spreadsheet for the project that includes the activity types, treatment methods and units of measure (e.g., acres, trees or number of activities). Provide a concise description of the design criteria, mitigation measures and effects of each treatment so the Level 1 Team can understand why the project has the determination given by the project biologist and so we have the necessary information to write the BA for this project. Refer to the level of project detail in the text of last year's programmatic NLAA and LAA BAs as examples of what information is needed. In submitting your project spreadsheet, combine units with the same effect. Be sure in the description provided below, that it is clear which row(s) of the spreadsheet the descriptions is referring to. For example, if you have 4 different treatments in suitable habitat, it is likely you will need to describe the effects of each one.

For any project that removes dispersal or suitable habitat, identify the number of acres of removal in known or potential owl home ranges and fill out the NSO site spreadsheet for each territory identifying the amount of removal of habitat in each home range and amount of suitable remaining in the core area and home range. The NSO site spreadsheet also needs to be filled out for any activities in a nest patch. If you have questions, contact your Level 1 representative.

The McKenzie River Ranger District is proposing to thin approximately 67 acres in one stand that is approximately 80-120 years old (Figure 1). Trees in the stand are 18-36" in diameter and are vigorously competing with neighboring trees for more space. Treatments would include 61 acres of commercial thinning, 6 acres of gaps, and 3 acres of skips. Thinning would primarily remove smaller, unhealthy trees and would be done with ground-based and skyline equipment. Associated activities would consist of road maintenance that includes rocking, brushing, blading, and rock compaction. Temporary road construction would not exceed 0.5 miles and there would be no permanent road construction, reconstruction, or culvert replacement. The stand contains a stream to the north that is excluded from the treatment area.

The proposed project would increase stand health and vigor; accelerate development of structural complexity; and provide wood products to the public. The proposed project is needed because the stand is a managed plantation that is currently in the stem exclusion stage of development and has low structural diversity, tree species, and understory plant diversity. Douglas fir is the primary overstory species with a minor component of hemlock. There are approximately 148 trees per acre, with an average diameter of 23.1 inches. This stand is characterized as being overstocked, dense, and homogeneous with declining vigor that leads to poor tree health.

The proposed treatment would result in a stand with an average of 40 percent canopy cover, and 40-45 residual trees per acre. The prescription would primarily leave the biggest and healthiest trees that have the largest crowns. The desired tree spacing from the thinning portion would vary between 18 to 36 feet, providing diversity in a more open environment to promote understory development by reducing the competition for light, water, and soil nutrients. The project would accelerate development of larger conifer trees and meet all the environmental requirements for soil, water, air, and wildlife habitat quality. Four gaps, or openings with a few large trees, of approximately one to three acres in size would be included in the 67 acre stand for a total of six acres. This would increase both diversity and shrub and forb habitat in the project area. The six acres of gaps and the dropped acres from the riparian reserves area would provide diversity on the landscape in this area.

Temporary spurs would be limited to no more than ½ mile in total length and use existing impacted areas wherever possible. Existing skid roads would be used as much as possible to minimize soil compaction.

Damage to residual trees, vegetation, and retained snags would be minimized when falling and yarding.

Snags would be retained when not a safety concern to support habitat for the northern spotted owl preybase as well as primary cavity excavators. If falling is required, they would be left on site as downed wood.

Existing large down woody material would be maintained for habitat diversity. The sale administrator would work with the purchaser to retain existing full tree lengths as much as possible.

Gaps would retain three trees per acre in clumps or individual trees to add diversity.

Reduce treatment-created fuels or natural fuel accumulations through various methods such as hand and machine piling, and pile burning to lessen the fire hazard. If handpiled slash piles are created, three to five piles per acre would be retained for wildlife benefits including . Machine piles are larger and thus, fewer would be retained. If underburning is later recommended, the final overstory canopy cover would be maintained at over 40%. Some individual tree mortality is acceptable and encouraged for wildlife benefits.

Fill in the items below.

- Describe the overall effects of the proposed project (NLAA/LAA). (Effects to LSR, RA32 habitat, critical habitat, and adverse effects to specific owl territories or sites are discussed below.)

Knoll Thin is a mature stand between 80-120 years old and is judged to contain a mix of dispersal and suitable spotted owl habitat. The aerial photo shows some areas that may be dispersal habitat, and a field review by the wildlife biologist has not yet been conducted. The forester who is proposing this project did not note any overstory legacy trees during the initial field assessment. If any large overstory trees are present, they would be left standing.

- Compare effects of treatment vs. no treatment (Effects to LSRs, RA 32 habitat, owls subject to RA10, and effects to critical habitat are discussed below.)
    - Will this treatment improve the overall quality of dispersal, forage or suitable habitat over time?

The treatment will provide diversity in a more open environment to promote understory development which will improve long-term stand structural diversity. The project will primarily leave the biggest and healthiest trees that possess the largest crowns.

- Will the treatment accelerate or delay the development of late and old growth characteristics?

The treatment may result in an increase in the rate of development of late successional characteristics.

- How long will it take for treated stands to develop into dispersal and suitable habitat with treatment compared to no-treatment?

Because a minimum of a 40% canopy cover would be maintained, the stand would remain as dispersal habitat after treatment. With this level of canopy retention, it would be expected to again reach suitable habitat stand quality in about 15 years, and the overall stand structure is expected to improve, compared to no-treatment.

- Additional rationale?

- Is the activity planned in any type of **Late Successional Reserve (LSR)**?

☐ Yes ☒ No

If yes, complete the following. Please address specific effects to LSRs here.

- How will the activity affect **LSR characteristics**?
- Is the activity consistent with any associated LSR Assessments, Management Plans, etc.? Please describe:
- Explain the rationale for conducting the activity, especially if detrimental. Include rationale and/or benefits of treatments that mitigate or improve stands based on "forest health" or "ecological forestry."

- Is the activity planned in **Recovery Action 32 habitat**?

☐ Yes ☒ No

If yes, complete the following.

- How will the activity affect RA 32 habitat? Explain the need and rationale for conducting the activity, especially if effects are detrimental.

  - Is the activity expected to disrupt owls, remove suitable or dispersal habitat, or have activities in a nest patch within a known or potential site territory?

☒ Yes ☐ No

If "yes", spotted owl sites should also be entered into the NSO_sites spreadsheet whether the action is LAA or NLAA.

If yes, complete the following.

- For all known or proposed owl sites that may be adversely affected, provide the following information.
  - MSNO or other owl site identifier. MSNOs 2449 and 0829
  - Identify the priority of the owl site under RA 10. Use ranking 1-10 identified in new appendix.

MSNO 2449 – 1 MSNO 0829 - 1

  - Describe the survey history regarding occupancy of the owl site (e.g., resident single, pair, unoccupied, unknown) and the nesting/reproductive status (e.g., nesting, non-nesting, unknown). Include when surveys were completed and if surveys were completed to protocol standards. If surveys have been recent, include the last five years. If surveys are historical (greater than 10 years ago), include the survey year that the activity center is based on.

MSNO 2449 was last found nesting in 2007, and a non-nesting pair was found in 2009. In spite of annual protocol surveys by the Oregon Cooperative Wildlife Research Unit, there have not been any nesting pair detections since that time. Non-nesting pairs were however detected in 2008, 2009, and 2010. A day resident single was detected in 2011.

MSNO 0829 was last found nesting in 2012. The annual surveys have not detected any spotted owls at this activity center since that time.

  - Describe the site condition of the owl sites.
    - Nest Patch, Core Area, and Home Range: Type of habitat, amount, and percentage within the nest patch both currently and after treatment.

MSNO 2449	Current Acres/%	After Treatment Acres/%

Nest Patch Suitable Habitat	34/49%	34/49%
Core Area Suitable Habitat	389/77%	389/77%
Home Range Suitable Habitat	1880/65%	1825/63%

MSNO 0829	Current Acres/%	After Treatment Acres/%
Nest Patch Suitable Habitat	62/89%	62/89%
Core Area Suitable Habitat	365/73%	328/65%
Home Range Suitable Habitat	1824/63%	1769/61%

- If LAA effects are due to **disruption**, describe the source of disruption, time of year and how many seasons disruption is expected to occur.

N/A

- If LAA effects are due to **general habitat modification** (e.g., removal or downgrade of suitable habitat), describe the type of effects and their duration.

Harvest – Habitat Downgrade of suitable and dispersal habitat thinning treatments may provide indirect beneficial effects to spotted owls because such treatments are expected to accelerate the growth of retained trees and could accelerate the rate at which some structural characteristics appear (e.g., large side limbs, greater crown ratios). While opening of the canopy may provide less suitable habitat conditions for the flying squirrel prey, leaving down wood and created piles would improve habitat conditions for other prey species such as woodrats.

- If LAA effects will occur to **known or potential owl territories**, describe these effects.
  - o Explain the rationale for all LAA effects to the territory, including the potential for harm.

Suitable habitat acres would remain above the threshold within the 0.5 mile core areas and home ranges. The nest core for MSNO 2449 was redrawn from a 0.5 mile-circle to show a more realistic habitat use pattern. The juxtaposition of suitable habitat within the former circular core area is very fragmented, and this area may not be used as much as the more contiguous suitable habitat patches to the north where there have been several years of responses in the 1990s and early 2000s. However, a goshawk has also been found in that location more than once (pers. comm. S.Ackers), which may result in less use of this area by the owls currently.

The nest core was delineated to exclude the unsuitable spotted owl habitat east of the 300m nest patch in Deer Creek and the Carmen-Smith transmission line which is unlikely to be used (Figure 1). The newly delineated nest core is believed to represent the actual habitat use area, if it is currently being used or will be in the future (Figure 2). The home range was kept the same as the 1.2-mile buffer around the Activity Center. Based on the home range and the new core area, post-treatment the project would maintain sufficient suitable habitat to maintain a functional home range.

Harvest – Habitat Downgrade would modify spotted owl suitable habitat to the extent that it no longer serves the function of nesting, roosting and foraging. It may, however, continue to function as dispersal habitat.

Since this activity would remove suitable habitat by downgrading it to dispersal, Harvest – Habitat Downgrade may affect, and is likely to adversely affect spotted owls directly and indirectly by impairing the nesting or forage opportunities of resident spotted owls in the affected stands.

- Include any considerations relevant to the ability of a territory to provide for pair occupation and nesting/reproduction.

The current condition of the Knoll Thin proposed treatment stand is that it contains a mix of dispersal and suitable habitat that does not have nesting potential. Downgrade of suitable habitat would modify spotted owl suitable habitat to the extent that it no longer serves the function of nesting, roosting and foraging. It may, however, continue to function as dispersal habitat. Since this activity would remove suitable habitat by downgrading it to dispersal, HH Downgrade may affect, and is likely to adversely affect spotted owl habitat either directly or indirectly by impairing the breeding or forage opportunities for resident spotted owls and reducing roosting opportunities for dispersing spotted owls.

- For dispersal habitat removed, describe why the action is LAA or NLAA.

No dispersal habitat would be removed.

- Is the activity planned in **spotted owl critical habitat**?

☒ Yes ☐ No

If yes, complete the following:

- Describe the need and rationale for implementing the activity, and the specific treatments, in critical habitat.

The project would accelerate development of larger conifer trees and bigger crowns, and improve structural habitat diversity in a younger mature stand under 120 years of age.

- Describe the effects to critical habitat (NLAA, LAA or NE [if activity is disruption-only]).

Thinning the ~67 acres in the Knoll Thin stand would downgrade up to 55 acres of 80-120 year old suitable habitat that is of poor quality for nesting. The ~12 acres of the stand that are dispersal habitat would be thinned to 40% canopy cover and be maintained as dispersal habitat. The thinning (HH Maintain) would result in an LAA determination due to habitat modification effects within two known owl home ranges.

The effect would be LAA for general habitat modification, NE for disturbance, and LAA to critical habitat.

- Address the effects of the activity(s) on PBFs (e.g., large trees, canopy complexity, snags and down logs; nesting, roosting, forage and dispersal habitats). Compare the effects of treatment vs. no treatment on PBF and habitat trajectories over a similar timeframe.

Without treatment, the project biologist estimated the stands would continue to slowly develop into higher quality suitable foraging habitat (PBF 3) over the next 40 years and improve over more time. Those areas with dispersal habitat would develop into low quality suitable habitat in the next 20 years. With treatment, the suitable habitat would be downgraded to dispersal habitat and recover to suitable habitat after ~15 years, at which time the habitat quality would be improved as discussed above. Due to the short-term effects to suitable habitat for about 15 years, the project biologist identified this potential effect as likely to adversely affect critical habitat. In the longer-term, the thinning should create more vegetation layers, larger sized trees, and greater canopy development compared to no-treatment which would benefit PBF 3. Snag and down wood habitat levels may be improved with this project if they do not currently meet Northwest Forest Plan levels and funding is available. Within critical habitat, large snags should be present at a minimum of 3/acre within 0.5 mile owl core areas, and 2/acre in treated suitable habitat. Down wood levels should be present at 3 and 2 trees/acre, respectively, and created if they are not present.

A delay of foraging habitat on ~55 acres of critical habitat is not expected to affect the future functionality of any owl sites since suitable habitat is currently above threshold levels within the known owl home ranges.

The treatments would downgrade about 55 acres of suitable habitat in critical habitat for about 15 years. To assess the effects to this temporary loss of suitable habitat on owl dispersal in the area, the project wildlife biologist evaluated the amount of dispersal and suitable habitat (since both habitats provide for dispersal) within 0.5 miles of the treatment units. A landscape photo shows good north-south suitable and contiguous habitat corridors, as well as east-west corridors surrounding both units that would continue to provide dispersal habitat without adversely impacting owl dispersal at this localized scale. No breaks in any existing corridor of forested habitat are expected to occur as a result of the proposed Knoll Thin treatment. Sufficient dispersal habitat would be maintained to provide for the life-history needs for dispersal for any spotted owls using this area. Therefore the action is not expected to adversely affect dispersal habitat (PBF 4) in critical habitat.

- How long would the attainment of suitable habitat be delayed or accelerated by the activity?

The treatments would not delay and could accelerate the development of PBF 2 (nesting/roosting habitat). Because the treatments are expected to increase diameter, crown radius, and crown ratio of individual trees, it is expected to improve the quality of PBF 2 in the long term and may be beneficial to PBF 2.

- Would there be sufficient suitable habitat in the immediate area after treatment to support a known or potential site?

Yes, see above discussion.

- Discuss the effects of activities not located in critical habitat that may adversely affect owl territory(s) where the owl center ***is*** located in critical habitat.

Both owl activity centers, most of the home range areas as well as the Knoll Thin proposed unit are located in critical habitat.

- Address special management considerations specific to the critical habitat unit.

Subunit WCS 3 which has about 319,736 acres is expected to function primarily for demographic support to the overall spotted owl population, as well as north-south connectivity between subunits. Since the proposed thinning would temporarily downgrade low quality suitable owl habitat on a landscape that shows adequate north-south connectivity based on a visual examination of an aerial photo, overall effects to the critical habitat subunit are judged to be NLAA.

WCS 3 West Cascades/Coast Ranges of Oregon and Washington

- Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands this recommendation applies to all land-use allocations (see also Thomas *et al.* 2006, pp. 284–285). *How does this activity meet this special management consideration?*

No RA32 habitat would be modified.

- Management emphasis needs to be placed on meeting northern spotted owl recovery goals and long-term ecosystem restoration and conservation. When there is a conflict between these goals, actions that would disturb or remove the essential physical or biological features of northern spotted owl critical habitat need to be minimized and reconciled with long-term ecosystem restoration goals. *How does this activity meet this special management consideration?*

The proposed Knoll Thin project has been designed to thin with a “light touch” treatment that would maintain a stand average of 40% canopy post treatment. The thinning treatment would improve stand structure and tree growth rates as described above and may provide benefits to the functions of critical habitat after 15 and more years.

- Continue to manage for large, continuous blocks of late-successional forest. *How does this activity meet this special management consideration?*

Maintaining a 40% canopy just east of the open Deer Creek and existing EWEB transmission line corridor will maintain the habitat functions of the large, continuous block of 80-120 year old forest. These habitat qualities would be improved in the future after about 15 years.

- In areas that are not currently late-seral forest or high-value habitat and where more traditional forest management might be conducted (e.g., matrix), these activities should consider applying ecological forestry prescriptions. Some examples that could be utilized include Franklin et al. (2002, pp. 417–421; 2007, entire), Kerr (2012), Drever et al. (2006, entire), Johnson and Franklin (2009, pp. 39–41), Swanson et al. (2010, entire), and others cited in the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, pp. III-14, III-17 to III-19). *Does the activity apply ecological forestry prescriptions?*

☒ Yes ☐ No

If yes, describe what measures will be used (e.g., % skips, dead wood creation, leaving legacy features, releasing hardwoods, diversity thinning prescription, etc.).

The Knoll Thin project includes a designated skip to the north of the proposed unit, will recommend the creation of snags and large down wood if it is not already present at the levels discussed in the 3rd bullet of #5 above, and would maintain primarily the largest conifers. A more open stand condition is expected to release hardwoods that are present.

Figure 1. Knoll Thin Project Location and Two Adjacent Spotted Owl Activity Centers. Yellow crosshatching shows the modified nest core for MSNO 2449.

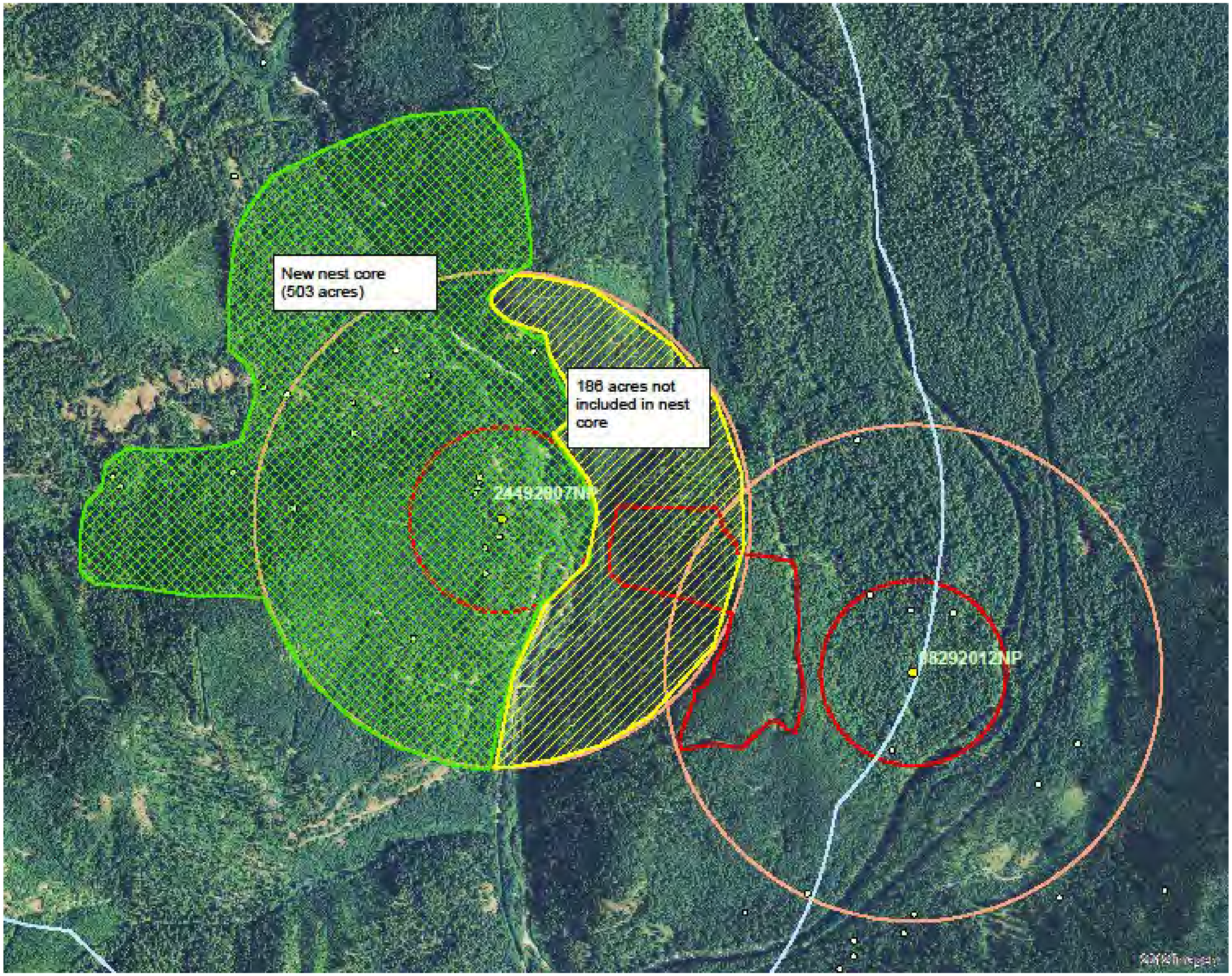
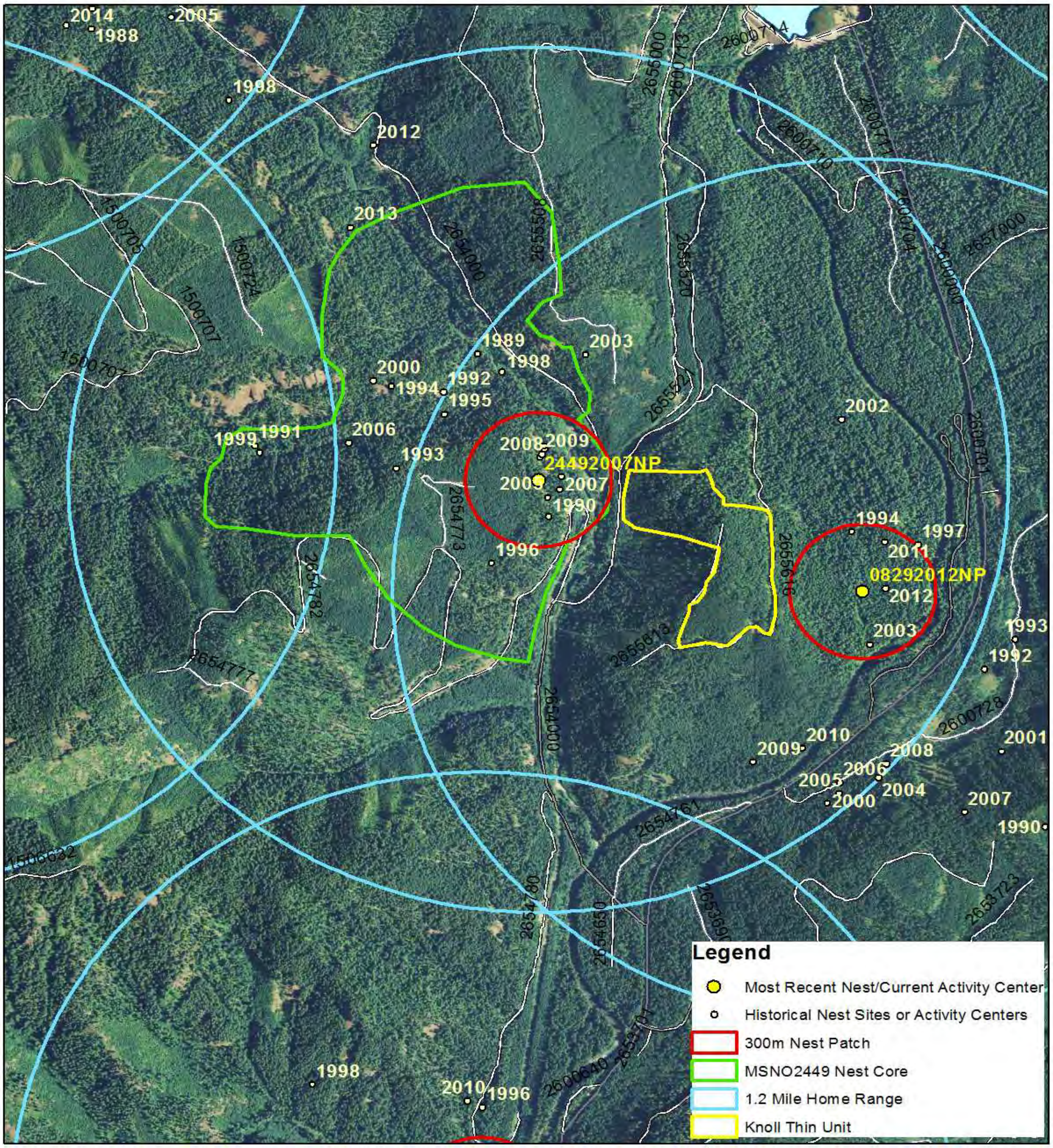


Figure 2. Redrawn MSNO 2449 Nest Core and 1.2 mile Radius Home Range.



Project Narrative for Willamette Province FY2017 Biological Assessments

District/RA	Project Name or Names	BA (NLAA or LAA)	Cascades (East or West)
McKenzie River	410 Rootrot Pocket Removal	LAA	West

Effects descriptions should include both beneficial and detrimental effects and their duration. This worksheet prompts for minimum information needed for activities and adversely affected spotted owl territories. Additional information may be required to adequately analyze the effects of an activity.

1. **Description of the project.** You will submit a spreadsheet for the project that includes the activity types, treatment methods and units of measure (e.g., acres, trees or number of activities). Provide a concise description of the design criteria, mitigation measures and effects of each treatment so the Level 1 Team can understand why the project has the determination given by the project biologist and so we have the necessary information to write the BA for this project. Refer to the level of project detail in the text of last year's programmatic NLAA and LAA BAs as examples of what information is needed. In submitting your project spreadsheet, combine units with the same effect. Be sure in the description provided below, that it is clear which row(s) of the spreadsheet the descriptions is referring to. For example, if you have 4 different treatments in suitable habitat, it is likely you will need to describe the effects of each one.

For any project that removes dispersal or suitable habitat, identify the number of acres of removal in known or potential owl home ranges and fill out the NSO site spreadsheet for each territory identifying the amount of removal of habitat in each home range and amount of suitable remaining in the core area and home range. The NSO site spreadsheet also needs to be filled out for any activities in a nest patch. If you have questions, contact your Level 1 representative.

The McKenzie River Ranger District is proposing to remove all Douglas fir trees within a ~ 6 acre stand that is 120 years old and has been identified to have extensive root disease. Douglas fir is the primary overstory species with a minor component of hemlock present. There are approximately 80 trees per acre, with an average diameter of 25.9 inches.

The treatment would create a buffer zone at least 50 feet from the outer edge of a symptomatic tree in order to curtail the spread of the root disease. The disease spreads between root contacts from infected to uninfected trees that kills the cambial tissue as it advances, and will eventually girdle and kill the tree roots. This project will remove live and dead trees, creating a buffer from the adjacent healthy forest in a matrix forest land allocation. Associated activities would consist of road maintenance that includes rocking, brushing, blading, and rock compaction. Temporary road construction would not exceed 0.5 miles and there would be no permanent road construction, reconstruction, or culvert replacement. The stand is adjacent to a Class IV stream that is located north of the project area.

Snags and downed logs may be created in or near the units after harvest if post-harvest levels are not sufficient. After the recently completed L'il Smokey Timber Sale, some of which overlaps the proposed Road 19 Root Rot Pocket Project, two wildlife trees were created per acre. A recommended mitigation measure for this project would include replacement of any such snags that are lost due to being a safety hazard to the logging operation. Replacement of this snag habitat would occur within ~100 feet in adjacent stands surrounding the unit. Because such treatments are usually done with KV or other funding sources that cannot be guaranteed at the time the treatments are being planned, snag and downed log creation is usually not a required design element of the treatment prescription unless it is needed to meet Northwest Forest Plan Standards and Guidelines. All Douglas fir trees, the host species for the root rot disease would be removed from within the six acre root rot pocket to restrict the spread of the root disease. All other tree species, conifer and hardwoods within this area would be retained.

All Douglas fir trees, the host species for the root rot disease will be removed from within the six acre root rot pocket to restrict the spread of the root disease. All other tree species, conifer and hardwoods within this area will be retained. Planting would occur within the root rot disease area. Planting would randomly space approximately 150 trees per acre with a mix of noble fir, western red cedar, Sugar pine, and western white pine.

Existing large down woody material would be maintained for habitat diversity. The sale administrator should work with the purchaser to retain existing full tree lengths as much as possible.

Treatment-created fuels or natural fuel accumulations would be reduced through various methods such as hand and machine piling, and pile burning to lessen the fire hazard.

Fill in the items below.

- Describe the overall effects of the proposed project (NLAA/LAA). (Effects to LSR, RA32 habitat, critical habitat, and adverse effects to specific owl territories or sites are discussed below.)

The overall effects of the project are LAA due to the removal of 1 acre of suitable owl habitat along the edges of the more open rootrot pocket in which trees have fallen, which consists of 4/5 acres of non-habitat. There is an additional 0.5 acre of dispersal habitat on the southern edge of the proposed unit that would be removed (Figure 2).

- Compare effects of treatment vs. no treatment (Effects to LSRs, RA 32 habitat, owls subject to RA10, and effects to critical habitat are discussed below.)
    - Will this treatment improve the overall quality of dispersal, forage or suitable habitat over time?

While the short-term effects of this treatment are detrimental to the currently existing suitable and dispersal owl habitat, longer term benefits are that this treatment may stop or slow the spread of the disease to surrounding dispersal and suitable habitat stands.

- Will the treatment accelerate or delay the development of late and old growth characteristics?

If the fungus were to continue to spread, any development of late and old growth characteristics of Douglas fir stands would be hindered.

- How long will it take for treated stands to develop into dispersal and suitable habitat with treatment compared to no-treatment?

For this rootrot infected area, treatment may reduce the timeframe for the treated stands to develop into dispersal and suitable habitat. It is expected that with no treatment, all existing trees may develop the fungus and blow down within 10 years, after which a new stand may reestablish. The fungus could also linger in the soil for more years in which case future stand development would be further delayed.

	# years to develop dispersal habitat	# years to develop suitable habitat
With treatment	40	80+
No treatment	50+	90+

- Additional rationale?

2. Is the activity planned in any type of **Late Successional Reserve (LSR)**?

☐ Yes ☒ No

If yes, complete the following. Please address specific effects to LSRs here.

- How will the activity affect **LSR characteristics**?
- Is the activity consistent with any associated LSR Assessments, Management Plans, etc.? Please describe:
- Explain the rationale for conducting the activity, especially if detrimental. Include rationale and/or benefits of treatments that mitigate or improve stands based on “forest health” or “ecological forestry.”

3. Is the activity planned in **Recovery Action 32 habitat**?

☐ Yes ☒ No

If yes, complete the following.

- How will the activity affect RA 32 habitat? Explain the need and rationale for conducting the activity, especially if effects are detrimental.

4. Is the activity expected to disrupt owls, remove suitable or dispersal habitat, or have activities in a nest patch within a known or potential site territory?

☒ Yes ☐ No

If "yes", spotted owl sites should also be entered into the NSO_sites spreadsheet whether the action is LAA or NLAA.

If yes, complete the following.

- For all known or proposed owl sites that may be adversely affected, provide the following information.
    - MSNO or other owl site identifier. 0835 and 2825
    - Identify the priority of the owl site under RA 10. Use ranking 1-10 identified in new appendix.

0835 – 2 2825 - 8

- Describe the survey history regarding occupancy of the owl site (e.g., resident single, pair, unoccupied, unknown) and the nesting/reproductive status (e.g., nesting, non-nesting, unknown). Include when surveys were completed and if surveys were completed to protocol standards. If surveys have been recent, include the last five years. If surveys are historical (greater than 10 years ago), include the survey year that the activity center is based on.

While MSNO 0835 and the area around the rootrot pocket have not been surveyed for many years, the area around MSNO 2825 have been surveyed to protocol standards each year since the late 1980s by the Oregon Cooperative Wildlife Research Unit.

The activity center for MSNO 0835 is based on a 1990 day resident single pair location. An evening single was also located in 1991. No additional recent owl locations have been detected since then. While habitat levels surrounding this site are quite low, surveys have not been conducted and thus, current occupancy is unknown and the site still has a high RA10 ranking of 2.

The activity center for MSNO 2825 is based on a 1991 non nesting pair location. Additional known locations include a 1992, 1993, 1995, and 2001 evening single.

- Describe the site condition of the owl site.
    - Nest Patch, Core Area, and Home Range: Type of habitat, amount, and percentage within the nest patch both currently and after treatment.

MSNO 0835	Current Acres/%	After Treatment Acres/%
Nest Patch Suitable Habitat	43/61%	43/61%
Core Area Suitable Habitat	202/40%	202/40%
Home Range Suitable Habitat	906/31%	905/31%

Note: For MSNO 0835, both Core Area and Home Range suitable habitat levels are below the 50% and 40% thresholds.

MSNO 2825	Current Acres/%	After Treatment Acres/%
Nest Patch Suitable Habitat	36/51%	36/51%
Core Area Suitable Habitat	314/62%	314/62%
Home Range Suitable Habitat	1551/54%	1550/54%

- If LAA effects are due to **disruption**, describe the source of disruption, time of year and how many seasons disruption is expected to occur.
- If LAA effects are due to **general habitat modification** (e.g., removal or downgrade of suitable habitat), describe the type of effects and their duration.

LAA effects are due to the removal of 1 acre of suitable owl habitat. Stand recovery would be expected in ~120 years.

- If LAA effects will occur to **known or potential owl territories**, describe these effects.
    - Explain the rationale for all LAA effects to the territory, including the potential for harm.

Habitat levels for MSNO 0835 are currently below threshold levels within the 0.5 mile core area as well as the 1.2 mile home range (see above). Removal of an acre of suitable owl habitat would reduce suitable habitat levels very slightly. Due to the distance from the activity center point and small amount of habitat removal, this project is not expected to cause a significant reduction in the functionality of MSNO 0835 or cause harm to any owls which might occupy this site. Removal of the root rot pocket may prevent or slow spread of this disease to the surrounding forest stands and thus, in the longer term the treatment could possibly benefit owl habitat levels if the large, adjacent trees remain standing and healthy.

- Include any considerations relevant to the ability of a territory to provide for pair occupation and nesting/reproduction.

- For dispersal habitat removed, describe why the action is LAA or NLAA.

The proposed action would be NLAA for dispersal habitat removed because only 0.5 acres would be affected.

5. Is the activity planned in **spotted owl critical habitat**?

☐ Yes ☒ No

If yes, complete the following:

- Describe the need and rationale for implementing the activity, and the specific treatments, in critical habitat.
- Describe the effects to critical habitat (NLAA, LAA or NE [if activity is disruption-only]).

- Address the effects of the activity(s) on PBFs (e.g., large trees, canopy complexity, snags and down logs; nesting, roosting, forage and dispersal habitats). Compare the effects of treatment vs. no treatment on PBF and habitat trajectories over a similar timeframe.
- How long would the attainment of suitable habitat be delayed or accelerated by the activity?
- Would there be sufficient suitable habitat in the immediate area after treatment to support a known or potential site?
- Discuss the effects of activities not located in critical habitat that may adversely affect owl territory(s) where the owl center ***is*** located in critical habitat.

- Address special management considerations specific to the critical habitat unit.

Figure 1.

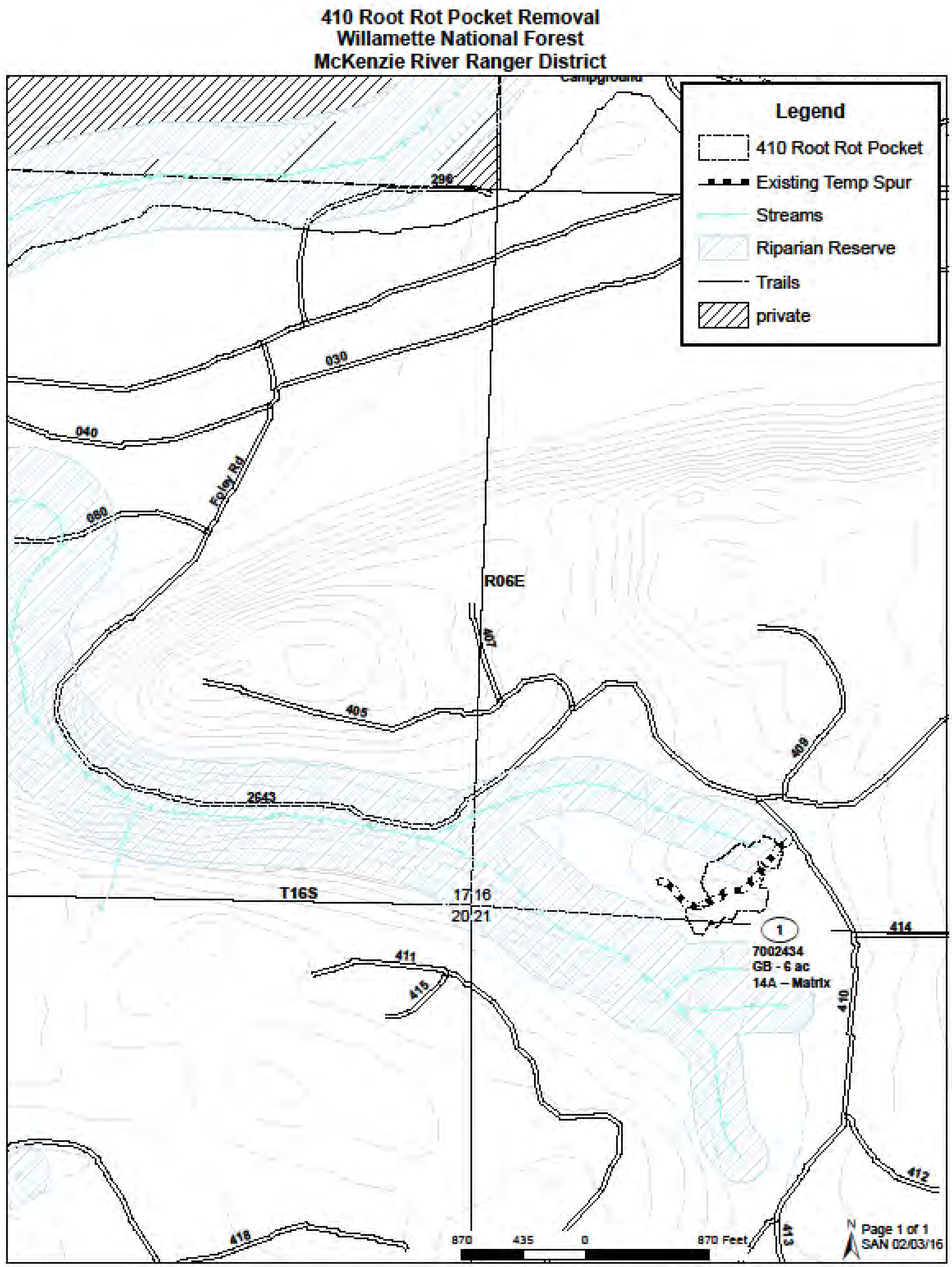

410 Root Rot Pocket Removal
Willamette National Forest
McKenzie River Ranger District
Legend
410 Root Rot Pocket
Existing Temp Spur
Streams
Riparian Reserve
Trails
private
290
030
040
Foley Rd
060
R06E
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Figure 2. 410 Rootrot Project Owl Habitat

Project Narrative for Willamette Province FY2017 Biological Assessments

District/RA	Project Name or Names	BA (NLAA or LAA)	Cascades (East or West)
McKenzie River Ranger District	Tamolitch Pools Trailhead Improvement	LAA	West

Effects descriptions should include both beneficial and detrimental effects and their duration. This worksheet prompts for minimum information needed for activities and adversely affected spotted owl territories. Additional information may be required to adequately analyze the effects of an activity.

1. **Description of the project.** You will submit a spreadsheet for the project that includes the activity types, treatment methods and units of measure (e.g., acres, trees or number of activities). Provide a concise description of the design criteria, mitigation measures and effects of each treatment so the Level 1 Team can understand why the project has the determination given by the project biologist and so we have the necessary information to write the BA for this project. Refer to the level of project detail in the text of last year's programmatic NLAA and LAA BAs as examples of what information is needed. In submitting your project spreadsheet, combine units with the same effect. Be sure in the description provided below, that it is clear which row(s) of the spreadsheet the descriptions are referring to. For example, if you have 4 different treatments in suitable habitat, it is likely you will need to describe the effects of each one.

For any project that removes dispersal or suitable habitat, identify the number of acres of removal in known or potential owl home ranges and fill out the NSO site spreadsheet for each territory identifying the amount of removal of habitat in each home range and amount of suitable remaining in the core area and home range. The NSO site spreadsheet also needs to be filled out for any activities in a nest patch. If you have questions, contact your Level 1 representative.

Fill in the items below.

- Describe the overall effects of the proposed project (NLAA/LAA). (Effects to LSR, RA32 habitat, critical habitat, and adverse effects to specific owl territories or sites are discussed below.)

The McKenzie River Ranger District is proposing to install an approximately 1.5 acre parking lot at the Tamolitch trailhead on the McKenzie River trail (Figure 1). Tamolitch Pools has quickly become one of the most popular recreation sites on the McKenzie River Ranger District. There is not enough parking to accommodate the existing use and visitors are parking wherever they can fit a vehicle, creating resource impacts.

Compare effects of treatment vs. no treatment (Effects to LSRs, RA 32 habitat, owls subject to RA10, and effects to critical habitat are discussed below.)

- Will this treatment improve the overall quality of dispersal, forage or suitable habitat over time?

No

Will the treatment accelerate or delay the development of late and old growth characteristics?

The parking lot installation will prevent reestablishment of late and old growth characteristics in the future.

How long will it take for treated stands to develop into dispersal and suitable habitat with treatment compared to no-treatment?

No future habitat would be provided at the proposed parking lot site.

Additional rationale?

The parking lot location would be placed over an area where there was past blowdown and a salvage sale, thus it would include a ~1 acre area of non-habitat and an additional ½ acre area of suitable owl habitat.

2. Is the activity planned in any type of **Late Successional Reserve (LSR)**?

☐ Yes ☒ No

If yes, complete the following. Please address specific effects to LSRs here.

- How will the activity affect **LSR characteristics**?
- Is the activity consistent with any associated LSR Assessments, Management Plans, etc.? Please describe:
- Explain the rationale for conducting the activity, especially if detrimental. Include rationale and/or benefits of treatments that mitigate or improve stands based on "forest health" or "ecological forestry."

3. Is the activity planned in **Recovery Action 32 habitat**?

☐ Yes ☒ No

If yes, complete the following.

- How will the activity affect RA 32 habitat? Explain the need and rationale for conducting the activity, especially if effects are detrimental.

4. Is the activity expected to disrupt owls, remove suitable or dispersal habitat, or have activities in a nest patch within a known or potential site territory?

☒ Yes ☐ No, this project would downgrade suitable owl habitat but not remove it.

If "yes", spotted owl sites should also be entered into the NSO_sites spreadsheet whether the action is LAA or NLAA.

If yes, complete the following.

- For all known or proposed owl sites that may be adversely affected, provide the following information.

    1. MSNO or other owl site identifier. MSNO 0822 and MSNO 2838
    2. Identify the priority of the owl site under RA 10. Use ranking 1-10 identified in new appendix.

MSNO 0822 – 8 MSNO 2838 - 9

3. Describe the survey history regarding occupancy of the owl site (e.g., resident single, pair, unoccupied, unknown) and the nesting/reproductive status (e.g., nesting, non-nesting, unknown). Include when surveys were completed and if surveys were completed to protocol standards. If surveys have been recent, include the last five years. If surveys are historical (greater than 10 years ago), include the survey year that the activity center is based on.

The proposed parking lot installment is located within the 1.2 mile home ranges of two owl sites: MSNO 0822 and MSNO 2838 (Figure 1). Both sites, as well as the area surrounding the proposed parking lot installment, have been annually surveyed by the Oregon Cooperative Wildlife Research Unit since the late 1980s and are currently covered to protocol standards.

MSNO 0822 had the last nesting pair was found in 2010. In 2011, a day resident single was found about 0.2 miles to the northwest of the current activity center which is about 0.9 miles from the proposed parking lot. In 2015, an evening single was found about 0.4 miles northwest of the activity center which is about 1 mile northwest of the proposed parking lot location.

MSNO 2838 had the last nesting pair found in 2004. More recent locations after 2004 include a 2006 evening single that was found about 0.2 miles north of the proposed parking lot. In 2005, an evening single was found about 0.3 miles southeast from the proposed parking lot.

4. Describe the site condition of the owl sites.
   (1) Nest Patch: Type of habitat, amount, and percentage within the nest patch both currently and after treatment.

No nest patch treatments are planned.

   (2) Core Area: Amount and percentage of suitable habitat in the core area currently and after treatment.

No treatment is planned in the core area of either owl site.

   (3) Home Range: Amount and percentage of suitable habitat in the home range currently and after treatment.

MSNO 0822	Current Acres/%	After Treatment Acres/%
Nest Patch Suitable Habitat	40/57%	40/57%
Core Area Suitable Habitat	430/85%	430/85%
Home Range Suitable Habitat	2125/73%	2124.5/73%

MSNO 2838	Current Acres/%	After Treatment

		Acres/%
Nest Patch Suitable Habitat	27/39%	27/39%
Core Area Suitable Habitat	242/48%	242/48%
Home Range Suitable Habitat	1673/58%	1672.5/58%

2. If LAA effects are due to **disruption**, describe the source of disruption, time of year and how many seasons disruption is expected to occur. No disruption would occur.

3. If LAA effects are due to **general habitat modification** (e.g., removal or downgrade of suitable habitat), describe the type of effects and their duration.

See above

4. If LAA effects will occur to **known or potential owl territories**, describe these effects.
    1. Explain the rationale for all LAA effects to the territory, including the potential for harm.

There would be no harm associated with this project and the project location is outside the 0.5 mile nest core areas of both nearby owl activity centers. The ~0.5 acre project footprint in suitable habitat is small and effects are expected to be very minor and have an insignificant effect on the functionality of the owl territories.

2. Include any considerations relevant to the ability of a territory to provide for pair occupation and nesting/reproduction.

No measurable effects from this small project are anticipated on owl territories.

For habitat removed, describe why the action is LAA or NLAA. Is the activity planned in **spotted owl critical habitat**?

☒ Yes ☐ No

If yes, complete the following:

1. Describe the need and rationale for implementing the activity, and the specific treatments, in critical habitat.

The entire area surrounding the Tamolitch Pools trailhead is in critical habitat and thus, effects cannot be avoided.

2. Describe the effects to critical habitat (NLAA, LAA or NE [if activity is disruption-only]).

Effects would be Likely to Adversely Affect the critical habitat unit due to the removal of suitable habitat.

Address the effects of the activity(s) on PBFs (e.g., large trees, canopy complexity, snags and down logs; nesting, roosting, forage and dispersal habitats). Compare the effects of treatment vs. no treatment on PBF and habitat trajectories over a similar timeframe.

5. PBF 1 is the forest types that support NSOs. This criterion was used to identify critical habitat affected by the project. Because the Tamolitch Pools Trailhead Improvement Project would not result in a change in forest type, there is no effect to this PBF.
6. PBFs 2, 3, and 4 (nesting/roosting, foraging, and dispersal habitat) were specifically considered with respect to the proposed action to determine if they were removed, reduced, maintained or enhanced at a stand level. The proposed project would remove about 0.5 acres of foraging habitat and the effects would last indefinitely after the parking lot is installed. Since there would be no down wood in the parking lot area, habitat for the preybase would be reduced. Down wood habitat levels were assessed in the field on April 21, 2016 and determined to be of moderate levels exceeding 240 feet/acre directly surrounding the proposed parking lot area, and over 300 lineal feet/acre in the nearby late successional forest.
7. The Tamolitch Pools TH Improvement Project would remove about 0.5 acres of suitable owl habitat in critical habitat and have a minor effect on PBFs 2, 3 and 4 at the stand scale. About one acre of non-habitat would be permanently maintained in that condition after the parking lot is installed. Any impacts to PBFs 2, 3 and 4 should not be significant or adverse at the subunit critical habitat scale.

8. How long would the attainment of suitable habitat be delayed or accelerated by the activity? Suitable habitat characteristics would not develop in the future, as described above.
9. Would there be sufficient suitable habitat in the immediate area after treatment to support a known or potential site?

With the adjacency to relatively high levels of suitable habitat in the immediate area surrounding the McKenzie River Wild and Scenic River, these levels would be maintained in the immediate area to support the two known sites.

10. Discuss the effects of activities not located in critical habitat that may adversely affect owl territory(s) where the owl center ***is*** located in critical habitat.

The entire proposed Tamolitch Pools TH Project is located in critical habitat, as well as the nearby owl activity centers (MSNOs 0822 and 2838).

11. Address special management considerations specific to the critical habitat unit.

WCS 3 West Cascades/Coast Ranges of Oregon and Washington

1. Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands this recommendation applies to all land-use allocations (see also Thomas *et al.* 2006, pp. 284–285). *How does this activity meet this special management consideration?*

The proposed project would not remove any RA 32 habitat. A small 0.5 acre patch of foraging owl habitat would be removed to provide an opening for the parking lot.

2. Management emphasis needs to be placed on meeting northern spotted owl recovery goals and long-term ecosystem restoration and conservation. When there is a conflict between these goals, actions that would disturb or remove the essential physical or biological features of northern spotted owl critical habitat need to be minimized and reconciled with long-term ecosystem restoration goals. *How does this activity meet this special management consideration?*

This project would modify a relatively small area of up to 1.5 acres for the proposed parking lot, and effects are expected to be minimal in terms of permanent spotted owl habitat loss.

3. Continue to manage for large, continuous blocks of late-successional forest. *How does this activity meet this special management consideration?*

The proposed project would create a minor intrusion upon a relatively large, continuous block of late-successional forest that connects to the McKenzie River Wild and Scenic river corridor. The parking lot is directly adjacent to a forest road and would enlarge that opening.

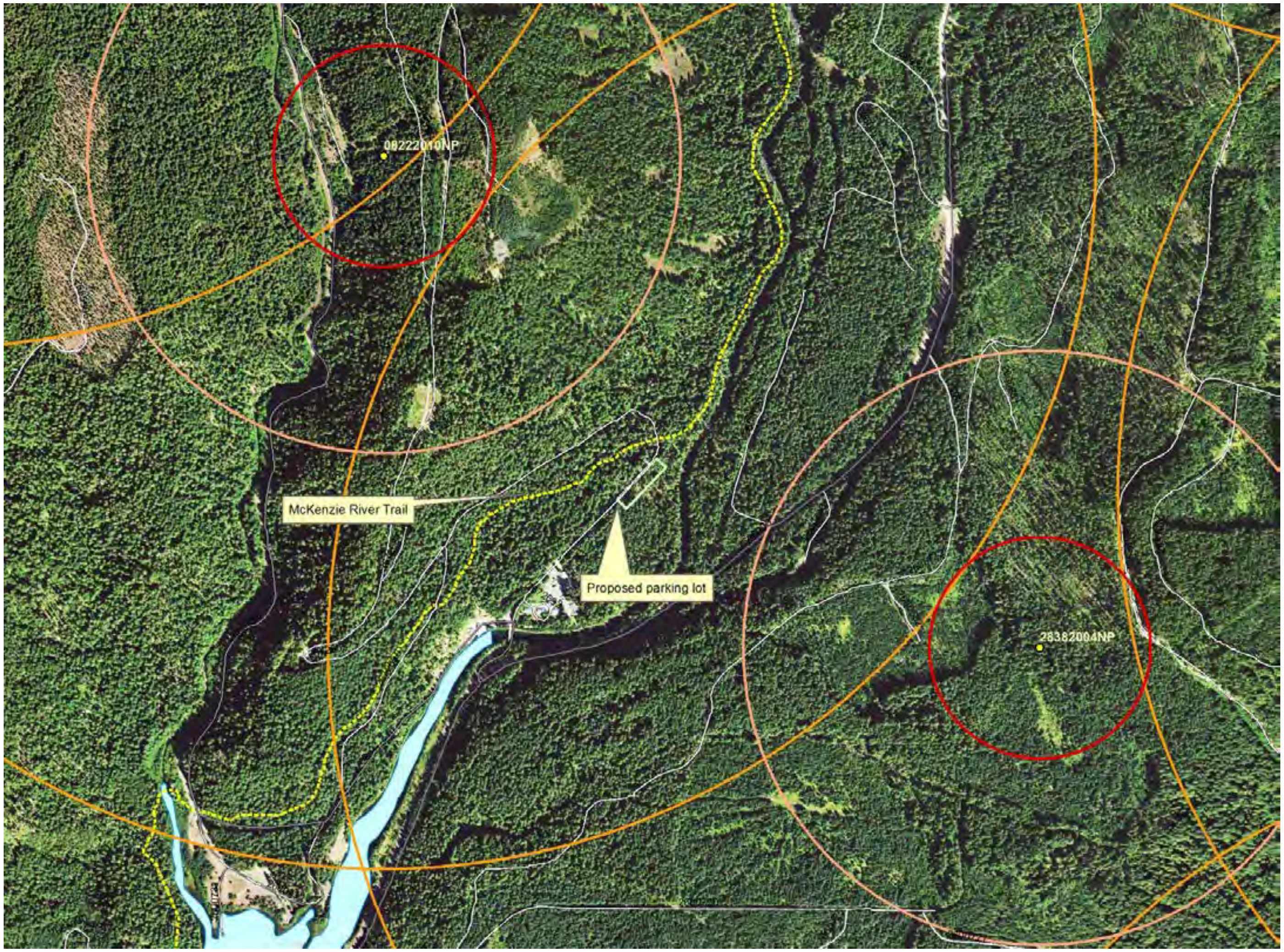
4. In areas that are not currently late-seral forest or high-value habitat and where more traditional forest management might be conducted (e.g., matrix), these activities should consider applying ecological forestry prescriptions. Some examples that could be utilized include Franklin et al. (2002, pp. 417–421; 2007, entire), Kerr (2012), Drever et al. (2006, entire), Johnson and Franklin (2009, pp. 39–41), Swanson et al. (2010, entire), and others cited in the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, pp. III-14, III-17 to III-19). *Does the activity apply ecological forestry prescriptions?*

☒ Yes ☒ No

If yes, describe what measures will be used (e.g., % skips, dead wood creation, leaving legacy features, releasing hardwoods, diversity thinning prescription, etc.).

If falling is required to any snags due a safety hazard adjacent to the proposed parking lot area, these snags will be left on site as downed wood if they do not pose a fire risk due to a large accumulation of dead wood near a high use public area. Down wood habitat levels were assessed in the field on April 21, 2016 and determined to be of moderate levels exceeding 240 feet/acre directly surrounding the proposed parking lot area, and over 300 lineal feet/acre in the nearby late successional forest.

Figure 1. Tamolitch Pools Trailhead Improvement Project location and two adjacent spotted owl activity centers.



Project Narrative for Willamette Province FY2017 Biological Assessments

District/RA	Project Name or Names	BA (NLAA or LAA)	Cascades (East or West)
McKenzie River/Willamette	Lower Road 19 Hazardous Fuels Project	LAA	West

Effects descriptions should include both beneficial and detrimental effects and their duration. This worksheet prompts for minimum information needed for activities and adversely affected spotted owl territories. Additional information may be required to adequately analyze the effects of an activity.

- **Description of the project.** You will submit a spreadsheet for the project that includes the activity types, treatment methods and units of measure (e.g., acres, trees or number of activities). Provide a concise description of the design criteria, mitigation measures and effects of each treatment so the Level 1 Team can understand why the project has the determination given by the project biologist and so we have the necessary information to write the BA for this project. Refer to the level of project detail in the text of last year's programmatic NLAA and LAA BAs as examples of what information is needed. In submitting your project spreadsheet, combine units with the same effect. Be sure in the description provided below, that it is clear which row(s) of the spreadsheet the descriptions is referring to. For example, if you have 4 different treatments in suitable habitat, it is likely you will need to describe the effects of each one.

For any project that removes dispersal or suitable habitat, identify the number of acres of removal in known or potential owl home ranges and fill out the NSO site spreadsheet for each territory identifying the amount of removal of habitat in each home range and amount of suitable remaining in the core area and home range. The NSO site spreadsheet also needs to be filled out for any activities in a nest patch. If you have questions, contact your Level 1 representative.

Fire and Fuels Management is proposing a hazardous fuels reduction and Scotch Broom weed treatment in the 19 Road/410 Road area (Figure 1). The treatment would cover about 275 acres.

The proposed actions would reduce hazardous fuels by thinning understory ladder fuels and therefore limiting the potential of high-severity canopy driven wildfires. Removing Scotch broom would limit spread of this invasive weed and promote growth of native vegetation ground cover. In addition, opening the understory would potentially help law enforcement detect illegal campers and reduce the impacts to natural resources in the area.

The Road 19 area has been heavily used by forest visitors for long-term dispersed camping. Although there is a Forest Order set in place for no overnight camping outside of designated campgrounds, the public continues to camp here illegally, often leaving abandoned campfires and polluting the banks of McKenzie River with garbage and human waste. McKenzie River Fire Management has responded to multiple human-caused fires (i.e. Red King and South Fork Fires) in this area over the last ten years. Thinning the understory would aid in suppression and reduce severity of these human caused wildfires. Scotch broom has invaded several spots within the project area due to disturbance.

The project would use up to three types of treatments: cut/lop and scatter/underburn, cut/pile/burn and cut/pile/burn/underburn. The treatments would be based on fuel loading, environmental factors (i.e. riparian areas, spotted owl habitat) and other restrictions including cultural significance. The 410/King Road project completed in fall 2015 will provide valuable insight to what treatment is most effective within the project area.

PROPOSED ACTIONS:

• Thin conifer trees less than 10" dbh; thin Pacific yew less than 3".

o Each unit will have specific dbh prescription based on stand size class to maintain enough cover for wildlife habitat and visual quality

o Leave trees at 20x20 foot spacing measured from drip line of all green trees greater than 10" dbh

o No living sugar pine or madrone will be cut.

• Thin all shrubs and brush less than 7".

• Cut all Scotch broom within project area.

• Cut all vine maple less than 7''. Cut all other deciduous trees less than 3" dbh (i.e. Pacific dogwood).

• Thin all deciduous trees less than 3" dbh (i.e. Pacific dogwood)

o Cut all dead or diseased conifer or deciduous trees and brush less than 10"

• Trees identified as per the USDA Field Guide for Danger Tree Identification and Response within reaching distance of the 410 Road, 19 Road and Highway 126 will be cut. These are the only trees > or + 10" dbh that would be cut with this treatment.

o Top boles and branch material from these trees would be treated with other project created slash with logs left for downed woody material for wildlife habitat.

• Stump height would be as low as possible, but no greater than 6" tall on the uphill side, or 4" above natural obstacles.

• Residual green trees may be pruned up to 8' from the ground but no higher than half of the total height of the tree

• Areas to protect include, but are not limited to:

o Any area identified in the Cougar Creek/South Fork McKenzie River Watershed Action Plan as needing protection.

o 60' from Class 1 and 2 streams

o 30' from Class 3 and 4 streams

o Any known sensitive resource identified (i.e. botanical, heritage, wildlife)

• Activity created slash will be treated in one of the following ways:

o Material would be cut, hand piled and burned.

• Approximately 2 piles/acre would not be covered with plastic material and would be left unburned for wildlife habitat. All piles within 100 feet of private lands would be burned.

o Brush and trees would be felled, lopped and left in place.

o Forest Service would conduct underburning following pile-burning or lop and scatter.

Wildlife Mitigation Measures:

All cut material over 5" dbh would be left on the ground as down woody material.

Leave a minimum of 2 unburned piles/acre for wildlife habitat.

Leave 4 unburned piles/acre in RA32 habitat.

Hazardous snags cut would be left on the ground as down woody material for wildlife habitat.

Underburning may kill some individual overstory trees, however this is not expected to substantially alter the overstory canopy cover nor spotted owl habitat type.

A seasonal operating restriction from March 1-July 15 would be applied to suitable owl habitat with potential nesting habitat structure, or within disruption distance. This habitat will be mapped upon field review and may include all suitable spotted owl habitat. The seasonal restriction may be waived if protocol owl surveys are conducted and the area is determined to be unoccupied or owls are non-nesting in the year of operation.

Fill in the items below.

- Describe the overall effects of the proposed project (NLAA/LAA). (Effects to LSR, RA32 habitat, critical habitat, and adverse effects to specific owl territories or sites are discussed below.)

While the proposed Lower 19 Road Hazardous Fuels Reduction Project would not result in an owl habitat category change, it would include treatments in suitable and RA32 habitat. Thus, the overall effects of this project to owl habitat are judged to be LAA because of the low understory cover that provides habitat for owl prey species. This project would not change the function of spotted owl suitable or dispersal habitat because only the understory would be treated. Up to 190 acres of the proposed units may contain RA32 habitat, however a field determination has not yet been conducted and this may be a high estimate.

Areas that are being dropped from the original project units for aquatics and wildlife considerations are 80-160 feet from the McKenzie River and side channels (Figure 1). While these areas to be dropped do not include the entire 360' riparian reserve, the fire risk benefits of not treating these areas are judged to exceed the small detrimental impact to the full width of the riparian reserve.

The project area has not been surveyed for spotted owls. An evaluation for potential owl sites found suitable owl habitat is well below threshold values so no potential nest sites were identified. The project does not propose to remove any suitable habitat acres, however it would make the sutiable habitat lower quality because of the reduction in understory cover that provides for spotted owl prey species.

- Compare effects of treatment vs. no treatment (Effects to LSRs, RA 32 habitat, owls subject to RA10, and effects to critical habitat are discussed below.)
    - Will this treatment improve the overall quality of dispersal, forage or suitable habitat over time?

This treatment may help protect the treated stands as well as adjacent stands from catastrophic wildfire. The area is especially vulnerable to wildfire because the incidence of illegal camping in the area is high, and there have been multiple responses over the past several years to human-caused fires. The results of the treatments would somewhat reduce the overall quality of habitat both in the short-and long-term by removing understory hiding cover for spotted owl prey such as woodrats, as well as reduce stand structural diversity by removing small conifers and shrubs which would contribute to the stand structure in the long-term.

-
    - Will the treatment accelerate or delay the development of late and old growth characteristics?

A single understory treatment would slightly delay the development of late successional characteristics. One treatment would not change the current spotted owl habitat type.

- How long will it take for treated stands to develop into dispersal and suitable habitat with treatment compared to no-treatment?

Treating only the understory conifers up to 10" dbh may delay the development of current dispersal habitat to suitable owl habitat for about 15 years. Currently suitable habitat is expected to remain in a suitable habitat condition although the quality would be reduced by removing the understory. Recovery to the current habitat quality would occur in 7-15 years.

- Additional rationale?

- Is the activity planned in any type of **Late Successional Reserve (LSR)**?

☐ Yes ☒ No

If yes, complete the following. Please address specific effects to LSRs here.

- How will the activity affect **LSR characteristics**?
- Is the activity consistent with any associated LSR Assessments, Management Plans, etc.? Please describe:
- Explain the rationale for conducting the activity, especially if detrimental. Include rationale and/or benefits of treatments that mitigate or improve stands based on "forest health" or "ecological forestry."

- Is the activity planned in **Recovery Action 32 habitat**?

☒ Yes ☐ No

If yes, complete the following.

- How will the activity affect RA 32 habitat? Explain the need and rationale for conducting the activity, especially if effects are detrimental.

While this project has not yet had a detailed field review by the wildlife biologist, it is likely that some of the project area includes RA32 habitat. Fire managers are recommending the proposed treatments due to the high incidence of homeless camping and the multiple responses to human-caused wildfires in the project area.

- Is the activity expected to disrupt owls, remove suitable or dispersal habitat, or have activities in a nest patch within a known or potential site territory?

☐ Yes ☒ No

If "yes", spotted owl sites should also be entered into the NSO_sites spreadsheet whether the action is LAA or NLAA.

If yes, complete the following.

- For all known or proposed owl sites that may be adversely affected, provide the following information.
  - MSNO or other owl site identifier. No known or potential sites in project area. Amount of suitable owl habitat is well below threshold levels for functional owl home ranges.
  - Identify the priority of the owl site under RA 10. Use ranking 1-10 identified in new appendix.
  - Describe the survey history regarding occupancy of the owl site (e.g., resident single, pair, unoccupied, unknown) and the nesting/reproductive status (e.g., nesting, non-nesting, unknown). Include when surveys were completed and if surveys were completed to protocol standards. If surveys have been recent, include the last five years. If surveys are historical (greater than 10 years ago), include the survey year that the activity center is based on.

No surveys have been completed.

  - Describe the site condition of the owl site.
    - Nest Patch: Type of habitat, amount, and percentage within the nest patch both currently and after treatment.
    - Core Area: Amount and percentage of suitable habitat in the core area currently and after treatment.
    - Home Range: Amount and percentage of suitable habitat in the home range currently and after treatment.
- If LAA effects are due to **disruption**, describe the source of disruption, time of year and how many seasons disruption is expected to occur.

A seasonal operating restriction from March 1-July 15 would be applied to activities within disruption distance of suitable owl habitat with potential nesting habitat structure. This habitat would be mapped upon field review and may include all suitable spotted owl habitat. The seasonal restriction may be waived if protocol owl surveys are conducted and the area is determined to be unoccupied or the owls are non-nesting in the year of operation.

- If LAA effects are due to **general habitat modification** (e.g., removal or downgrade of suitable habitat), describe the type of effects and their duration.

The proposed fuels reduction treatment would affect structural stand characteristics because the understory treatments would remove small diameter trees under 10" dbh that would contribute to the future stand structure. Over the time of stand development, some of these trees would eventually contribute to the canopy, and others would become snags of various sizes and later down wood on the forest floor. This would provide valuable habitat for the spotted owl preybase over time. The effects of a single fuels reduction treatment as proposed would be somewhat limited. If these treatments are later regularly repeated over many decades, effects would increase because those areas of the stands that are treated would eventually show little to no understory and midstory development because most of the smaller understory trees would be removed. Any such future actions would have to be consulted on before implementation.

The 410 Road Hazardous Fuels Reduction Project was field reviewed on April 27, 2016. This project was implemented on about 94 acres in a mix of suitable, dispersal and non-habitat for spotted owls. Project design was very similar to the proposed Lower 19 Road Hazardous Fuels Reduction Project with the exception of the proposed understory treatment diameters of the latter being up to 10”dbh. The 410 Road project treated understory diameters up to 7”dbh. Photos from this recently completed project are shown in Attachment B.

- If LAA effects will occur to **known or potential owl territories**, describe these effects.
    - Explain the rationale for all LAA effects to the territory, including the potential for harm.

No known or potential owl home ranges present.

- - Include any considerations relevant to the ability of a territory to provide for pair occupation and nesting/reproduction.
- For dispersal habitat removed, describe why the action is LAA or NLAA.

No dispersal habitat would be removed, however it would be degraded due to the understory removal. Maintaining dispersal habitat should allow spotted owls to continue to use those stands for dispersal since the function of the stand as dispersal habitat is expected to be retained.

- Is the activity planned in **spotted owl critical habitat**?

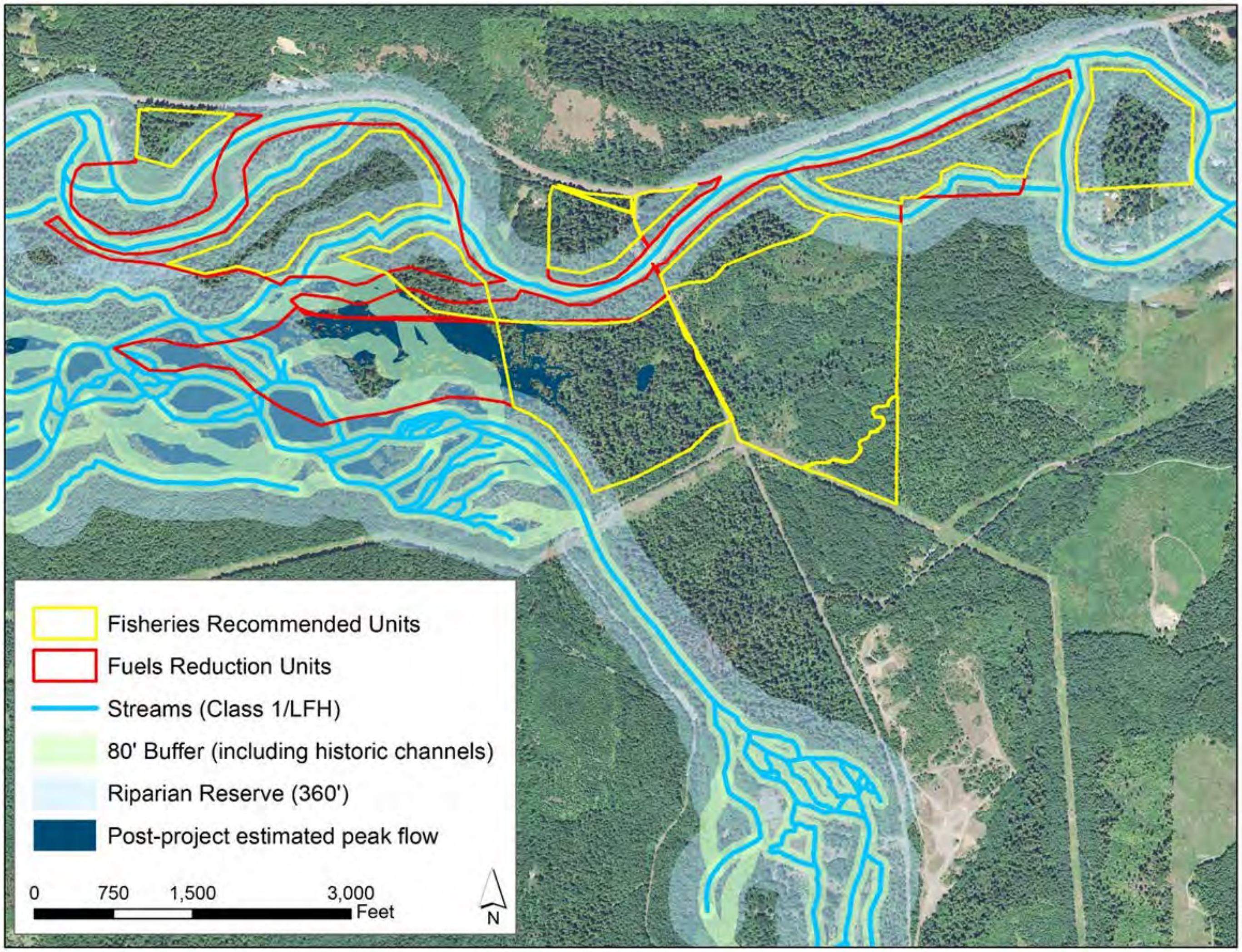
☐ Yes ☒ No

If yes, complete the following:

- Describe the need and rationale for implementing the activity, and the specific treatments, in critical habitat.
- Describe the effects to critical habitat (NLAA, LAA or NE [if activity is disruption-only]).
- Address the effects of the activity(s) on PBFs (e.g., large trees, canopy complexity, snags and down logs; nesting, roosting, forage and dispersal habitats). Compare the effects of treatment vs. no treatment on PBF and habitat trajectories over a similar timeframe.
- How long would the attainment of suitable habitat be delayed or accelerated by the activity?
- Would there be sufficient suitable habitat in the immediate area after treatment to support a known or potential site?

- Discuss the effects of activities not located in critical habitat that may adversely affect owl territory(s) where the owl center ***is*** located in critical habitat.
- Address special management considerations specific to the critical habitat unit.

Figure 1. Units outlined in yellow show the modified project footprint with portions of riparian reserves dropped from the unit boundaries.

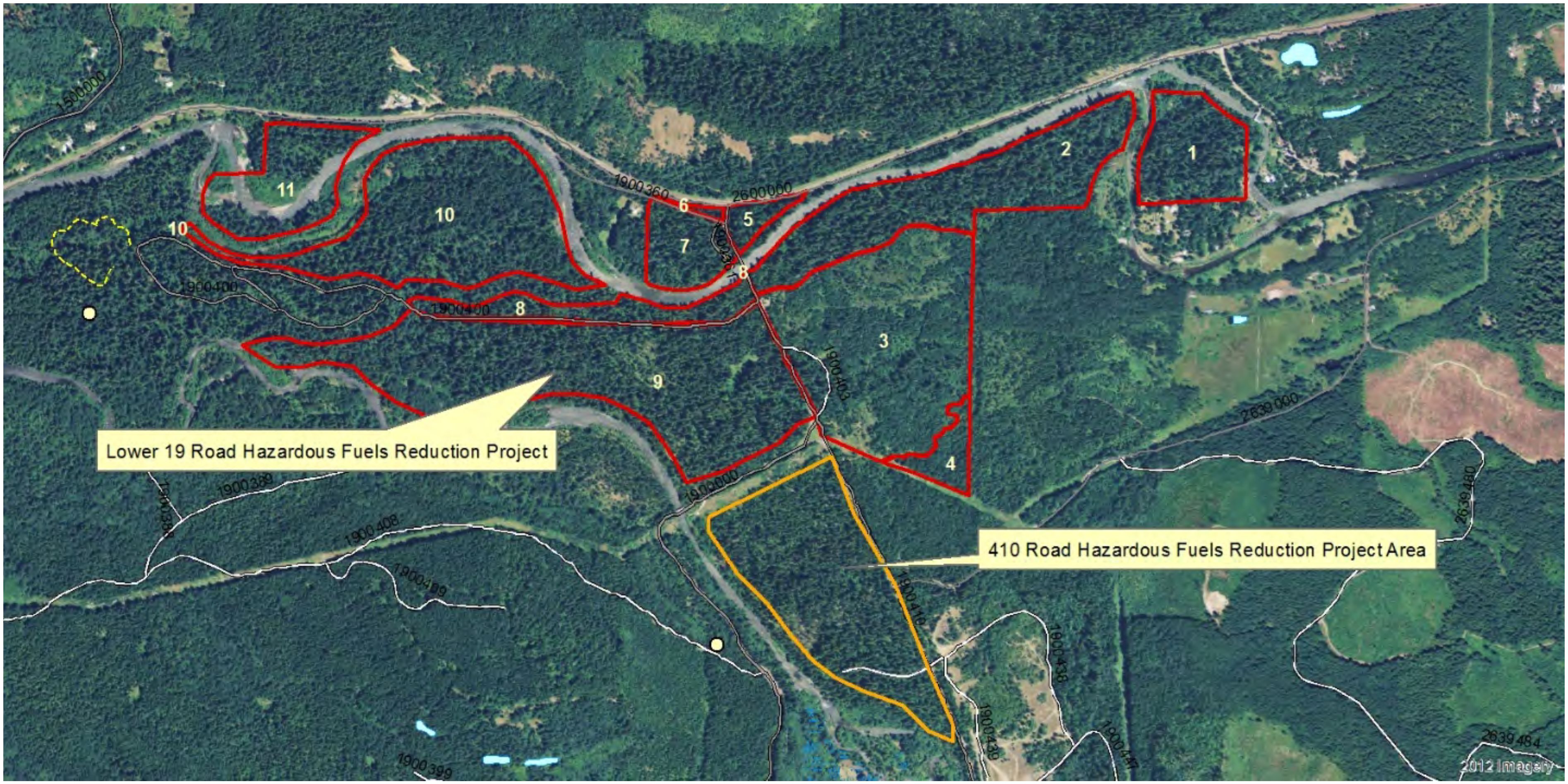


Attachment B. 410 Road Hazardous Fuels Reduction Project.

Lower 19 Road Hazardous Fuels Project Additional Information - McKenzie River Ranger District – Willamette National Forest

The following photos were taken of the ongoing 410 Road Hazardous Fuels Project area in April 2016 which had a treatment similar to the proposed Lower 19 Road Hazardous Fuels Project. These projects are adjacent to one another across Road 19. They differ in that the proposed Lower 19 Road project would treat understory trees up to 10" dbh, while the former project treated understory trees up to 7" dbh. The 410 road project piled the small understory material, and will leave up to two piles/acre unburned for wildlife habitat. The Lower 19 Road Hazardous Fuels project would pile material, leaving up to four piles/acre unburned in RA32 habitat, and may also underburn portions of the stands.

Project	Stand composition	Understory treatment	Slash treatment
410 Road Hazardous Fuels Project (mostly completed with piles still to be burned)	Mix of non-habitat, dispersal and suitable owl habitat.	Cuts conifers under 7" dbh	Pile and burn, leaving up to 2 unburned piles/acre.
Lower 19 Road Hazardous Fuels Project (proposed)	Stand with non-habitat broken out for immediate treatment. Remainder contains some dispersal and mostly suitable, much of which is RA32 habitat	Cuts conifers under 10" dbh	Pile and burn, leaving up to 2 unburned piles/acre across the project and 4 piles/acre in RA32 habitat. Some of the areas may also be underburned.


Lower 19 Road Hazardous Fuels Reduction Project
410 Road Hazardous Fuels Reduction Project Area
1
2
3
4
5
6
7
8
9
10
11
2012 Imagery


04/27/2016 15:33

The edge of the mostly completed 410 Road project is bisected by an electric line which requires regular clearing of all understory vegetation. There is no electric line in the proposed Lower 19 Road project area, however it is surrounded by Delta Campground.

Owl Site Information and Narratives for Known Projects Proposed by the Middle Fork Ranger District, Willamette National Forest

Project Narrative for Willamette Province FY2017 Biological Assessments

District/RA	Project Name or Names	BA (NLAA or LAA)	Cascades (East or West)
Middle Fork RD	Carpet Hill and Deception Quarries	LAA	West

Effects descriptions should include both beneficial and detrimental effects and their duration. This worksheet prompts for minimum information needed for activities and adversely affected spotted owl territories. Additional information may be required to adequately analyze the effects of an activity.

Description of the project. You will submit a spreadsheet for the project that includes the activity types, treatment methods and units of measure (e.g., acres, trees or number of activities). Provide a concise description of the design criteria, mitigation measures and effects of each treatment so the Level 1 Team can understand why the project has the determination given by the project biologist and so we have the necessary information to write the BA for this project. Refer to the level of project detail in the text of last year's programmatic NLAA and LAA BAs as examples of what information is needed. In submitting your project spreadsheet, combine units with the same effect. Be sure in the description provided below, that it is clear which row(s) of the spreadsheet the descriptions is referring to. For example, if you have 4 different treatments in suitable habitat, it is likely you will need to describe the effects of each one.

For any project that removes dispersal or suitable habitat, identify the number of acres of removal in known or potential owl home ranges and fill out the NSO site spreadsheet for each territory identifying the amount of removal of habitat in each home range and amount of suitable remaining in the core area and home range. The NSO site spreadsheet also needs to be filled out for any activities in a nest patch.

Development and expansion of two quarries is proposed on the Middle Fork Ranger District to support an increased need for road improvement and maintenance materials near existing and proposed timber sales. Equipment used in pit development would include rock crushers, excavators, dozers, air track drills, chain saws, and blasting equipment.

The Deception Quarry is located adjacent to a road within suitable NSO habitat. The center of the proposed quarry is currently a small opening with exposed rock surrounded by smaller diameter trees. Suitable habitat is present around the periphery of the project area and would be removed to expand the quarry. Up to 2 acres of suitable habitat would be removed. A small patch of RA32 habitat with scattered legacy trees (estimated 300+ year old stand) is present on the southern edge of the project area. The project biologist will flag the boundary of the RA32 habitat prior to implementation to ensure that no legacy trees are removed.

The Carpet Hill Quarry is an existing pit approximately 2 acres in size. Suitable habitat is present around the periphery of the project area and would be removed to expand the quarry. Up to 2 acres of suitable habitat would be removed resulting in an opening around 4 acres in size. The suitable habitat is not RA32 habitat.

Blasting would not occur between March 1 and July 15. Surveys would be conducted within 0.25 miles of the quarries to ensure that activities would not impact undiscovered nest patches. Suitable habitat would be surveyed to protocol prior to project implementation. If a nest is found within 0.25 miles, seasonal restrictions on blasting would be extended to September 30. Quarry activities including rock crushing would not be allowed within 120 yards of an identified 300-m nest patch from March 1 - July 15. If any proposed habitat removal was determined to occur within a newly identified nest patch, project effects would need to be re-evaluated.

Fill in the items below.

- Describe the overall effects of the proposed project (NLAA/LAA). (Effects to LSR, RA32 habitat, critical habitat, and adverse effects to specific owl territories or sites are discussed below.)

LAA – This project would remove suitable habitat at two locations creating gaps 2-4 acres in size. Seasonal restrictions would be in place to avoid disruption to NSO, but some disturbance could occur due to noise from quarry activities resulting in a NLAA determination for disturbance.

- Compare effects of treatment vs. no treatment (Effects to LSRs, RA 32 habitat, owls subject to RA10, and effects to critical habitat are discussed below.)
    - Will this treatment improve the overall quality of dispersal, forage or suitable habitat over time?

No, this project would remove suitable habitat and delay development of dispersal and suitable habitat in the future.

- Will the treatment accelerate or delay the development of late and old growth characteristics?

This project would delay the development of late and old growth characteristics.

- How long will it take for treated stands to develop into dispersal and suitable habitat with treatment compared to no-treatment?

Currently, these areas contain some suitable habitat. Recovery of the area into dispersal and suitable habitat after treatment would be delayed until the quarry was no longer needed and some portions may not be suitable for tree growth after project completion resulting in a permanent opening.

- Additional rationale?

- Is the activity planned in any type of **Late Successional Reserve (LSR)**?

☒ Yes ☐ No

If yes, complete the following. Please address specific effects to LSRs here.

- How will the activity affect **LSR characteristics**?

The Deception Quarry is located within an LSR. This activity would create a 2-acre gap and delay the development of late successional or old-growth characteristics. After the project is completed, portions of the quarry may no longer be suitable for tree growth resulting in a permanent opening.

- Is the activity consistent with any associated LSR Assessments, Management Plans, etc.? Please describe:

All proposed activities would be consistent with LSR assessments and management plans. If it is determined that an REO exemption is required, it would be obtained prior to issuing a decision.

- Explain the rationale for conducting the activity, especially if detrimental. Include rationale and/or benefits of treatments that mitigate or improve stands based on "forest health" or "ecological forestry."

Development of the quarries is needed to support existing and proposed timber sale activities on the Middle Fork Ranger District. Timber sale activities include thinning and stand improvement throughout the district. Locations of potential rock sources are fixed and must be within reasonable proximity to other project activities to be cost effective.

- Is the activity planned in **Recovery Action 32 habitat**?

☐ Yes ☒ No

If yes, complete the following.

- How will the activity affect RA 32 habitat? Explain the need and rationale for conducting the activity, especially if effects are detrimental.

The Deception quarry is adjacent to a small patch of RA32 habitat. This habitat would not be removed, but a gap will be created next to it. This patch of habitat is bounded by a road and adjacent to a recently burned area that is slated for salvage. Any effects to RA32 habitat from this project are expected to be minimal and insignificant.

- Is the activity expected to disrupt owls, remove suitable or dispersal habitat, or have activities in a nest patch within a known or potential site territory?

☒ Yes ☐ No

If "yes", spotted owl sites should also be entered into the NSO_sites spreadsheet whether the action is LAA or NLAA.

If yes, complete the following.

- For all known or proposed owl sites that may be adversely affected, provide the following information.
  - MSNO or other owl site identifier.

MSNO 2896 would be affected by expanding the Carpet Hill Quarry.

Identify the priority of the owl site under RA 10. Use ranking 1-10 identified in new appendix.

1 – Historic site, no surveys within the last ten years and habitat above thresholds.

  - Describe the survey history regarding occupancy of the owl site (e.g., resident single, pair, unoccupied, unknown) and the nesting/reproductive status (e.g., nesting, non-nesting, unknown). Include when surveys were completed and if surveys were completed to protocol standards. If surveys have been recent, include the last five years. If surveys are historical (greater than 10 years ago), include the survey year that the activity center is based on.

Activity center is based on pair detections during survey year 1990. Surveys were conducted at this site in 1990, 1991, 1992, 1995, 1996, and 1999. Last year of survey was in 1999 when a pair was detected, but nesting/reproductive status was not determined.

  - Describe the site condition of the owl site.
    - Nest Patch: Type of habitat, amount, and percentage within the nest patch both currently and after treatment.

Current suitable habitat = 69 acres (99%)

No treatments occurring within the nest patch.

    - Core Area: Amount and percentage of suitable habitat in the core area currently and after treatment.

Current suitable habitat = 458 acres (91%)

No treatments occurring within the core area.

    - Home Range: Amount and percentage of suitable habitat in the home range currently and after treatment.

Current suitable habitat = 2232 acres (77%)

Suitable habitat after treatment = 2230 acres (77%)

- If LAA effects are due to **disruption**, describe the source of disruption, time of year and how many seasons disruption is expected to occur.

Disruption is not expected to occur due to project activities because of surveys and seasonal restrictions..

- If LAA effects are due to **general habitat modification** (e.g., removal or downgrade of suitable habitat), describe the type of effects and their duration.

Expanding the Deception Quarry would remove up to 2 acres of suitable habitat and enlarge the current opening in the stand. Expanding the Carpet Hill Quarry would also remove suitable habitat and create an opening in the stand up to 4 acres in size. The suitable habitat being proposed for removal is likely used for foraging and lacks the size and structural characteristics necessary to provide quality nesting habitat. Both of these quarries are located next to existing well-maintained roads. Initial clearing of habitat would be of short duration, but quarry activities including rock crushing and hauling are likely to occur intermittently over many years. Recovery of the area into dispersal and suitable habitat would be delayed until the quarry was no longer needed and some portions may not be suitable for tree growth after project completion resulting in permanent openings.

- If LAA effects will occur to **known or potential owl territories**, describe these effects.
    - o Explain the rationale for all LAA effects to the territory, including the potential for harm.

The Carpet Hill Quarry is located within a known owl territory. The existing quarry is along a well-maintained road on the outer edge of the home range for the Winberry-Armet Creek NSO site. LAA effects would occur to habitat from removal of 2 acres of suitable habitat and creation of a 4-acre gap. Activities are not proposed in the nest patch or core area of this site and would not change the percentage of available suitable habitat within the home range (77%). Surveys would be conducted within 0.25 miles of the quarries to ensure that activities would not impact undiscovered nest patches. Seasonal restrictions would be in place to avoid potential for disruption. If any proposed habitat removal was determined to occur within a newly identified nest patch, project effects would need to be re-evaluated.

- o Include any considerations relevant to the ability of a territory to provide for pair occupation and nesting/reproduction.

Sufficient habitat would remain in the core area and home range to support pair occupation and nesting/reproduction. Removing 2 acres of suitable habitat does not change the percentage of available suitable habitat in the home range (77%) and is expected to have a minimal effect on the functionality of the site.

- For dispersal habitat removed, describe why the action is LAA or NLAA.

Dispersal habitat would not be removed.

- Is the activity planned in **spotted owl critical habitat**?

☒ Yes ☐ No

If yes, complete the following:

- Describe the need and rationale for implementing the activity, and the specific treatments, in critical habitat.

Development of the quarries is needed to support existing and proposed timber sale activities on the Middle Fork Ranger District. Locations of potential rock sources are fixed and must be within reasonable proximity to other project activities to be cost effective.

- Describe the effects to critical habitat (NLAA, LAA or NE [if activity is disruption-only]).

LAA - Expanding the Deception quarry would remove up to 2 acres of critical habitat and enlarge the current opening in the stand. Expanding the Carpet Hill quarry would also remove 2 acres of critical habitat and create a 4-acre opening in the stand. Recovery of the area into dispersal and suitable habitat would be delayed until the quarries were no longer needed and some portions may not be suitable for tree growth after project completion resulting in permanent openings.

- Address the effects of the activity(s) on PBFs (e.g., large trees, canopy complexity, snags and down logs; nesting, roosting, forage and dispersal habitats). Compare the effects of treatment vs. no treatment on PBF and habitat trajectories over a similar timeframe.
- How long would the attainment of suitable habitat be delayed or accelerated by the activity?

The areas surrounding the existing quarry footprints are currently suitable habitat. Removing this habitat would substantially delay the attainment of suitable habitat in the future. Clearing these areas for quarry development would essentially result in 2-4 acre gaps with no large trees, no canopy cover, and complete removal of snags/down logs and understory vegetation.

- Would there be sufficient suitable habitat in the immediate area after treatment to support a known or potential site?

Yes, sufficient quantities of suitable habitat would remain in the immediate area. Removing 2 acres of suitable habitat at each quarry site would not change the ability of these areas to support a known or potential NSO site.

- Discuss the effects of activities not located in critical habitat that may adversely affect owl territory(s) where the owl center ***is*** located in critical habitat.

N/A

- Address special management considerations specific to the critical habitat unit.

WCS 4 West Cascades/Coast Ranges of Oregon and Washington

- o Conserve older stands that contain the conditions to support northern spotted owl occupancy or high-value northern spotted owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands this recommendation applies to all land-use allocations (see also Thomas *et al.* 2006, pp. 284–285). *How does this activity meet this special management consideration?*

Some suitable habitat would be removed, but all RA32/high-value habitat identified was specifically excluded from the project areas and would not be removed.

- o Management emphasis needs to be placed on meeting northern spotted owl recovery goals and long-term ecosystem restoration and conservation. When there is a conflict between these goals, actions that would disturb or remove the essential physical or biological features of northern spotted owl critical habitat need to be minimized and reconciled with long-term ecosystem restoration goals. *How does this activity meet this special management consideration?*

This activity does not contribute to meeting NSO recovery goals, however, the small scale of habitat removed would have a minimal impact on the functionality of critical habitat and known owl sites.

- o Continue to manage for large, continuous blocks of late-successional forest. *How does this activity meet this special management consideration?*

This activity does not contribute to maintaining continuous blocks of late-successional forest, however, the small scale of habitat removed and the location along existing well-maintained roads would have a minimal impact on continuity and connectivity of habitat.

- o In areas that are not currently late-seral forest or high-value habitat and where more traditional forest management might be conducted (e.g., matrix), these activities should consider applying ecological forestry prescriptions. Some examples that could be utilized include Franklin et al. (2002, pp. 417–421; 2007, entire), Kerr (2012), Drever et al. (2006, entire), Johnson and Franklin (2009, pp. 39–41), Swanson et al. (2010, entire), and others cited in the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011, pp. III-14, III-17 to III-19). *Does the activity apply ecological forestry prescriptions?* ☐ Yes ☒ No

APPENDIX D: Potential Spotted Owl Site Considerations

The following potential spotted owl site considerations are from the BA (FS 2016, pp. 180-247).

Scientific Basis for Analysis

The information in this appendix informs the analysis conducted by the Willamette Province Level 1 Team within this consultation. Collectively, this information provides the contextual information used to develop the general analytical framework described within this document through a synthesis of the best available science.

Since the complete range-wide population surveys for the spotted owls are not available, it is a well-established analytical approach to analyze the effects of proposed activities on the spotted owl based on the extent, duration and timing of habitat-altering activities. Effects are based on how habitat modification activities are likely to affect spotted owl nesting, roosting, foraging, and dispersal behavior based on known spatial and habitat use relationships exhibited by the spotted owl (USDI BLM et al. 1994, Lehmkuhl and Raphael 1993, Raphael et al. 1996, Meyer et al. 1998, and Courtney et al. 2004).

The amount of forest habitat likely to be used by spotted owls is based on the known range of habitat conditions used by spotted owls for nesting, roosting, and foraging (Thomas et al. 1990; Courtney et al. 2004). In addition, the basis for finding that a proposed action is likely to significantly impair the breeding, feeding, sheltering and/or dispersal of affected spotted owls relies on the scientifically-recognized range of habitat conditions that are known to adequately provide for spotted owl life history requirements.

Spotted owls exhibit consistent patterns of habitat association, and these patterns provide the foundation for assessing the potential effects caused by land management activities. In the 1990 Conservation Strategy for the Northern Spotted Owl, the Interagency Scientific Committee (Thomas et al. 1990) stated that:

"With the exception of recent studies in the coastal redwoods of California, all studies of habitat use suggest that old-growth forests are superior habitat for northern spotted owls. Throughout their range and across all seasons, spotted owls consistently concentrated their foraging and roosting in old-growth or mixed-age stands of mature and old-growth trees....Structural components that distinguish superior spotted owl habitat in Washington, Oregon, and northwestern California include: a multilayered, multispecies canopy dominated by large (>30 inches dbh) conifer overstory trees, and an understory of shade-tolerant conifers or hardwoods; a moderate to high (60-80 percent) canopy closure; substantial decadence in the form of large, live coniferous trees with deformities- such as cavities, broken tops, and dwarf mistletoe infections; numerous large snags; ground cover characterized by large accumulations of logs and other woody debris; and a canopy that is open enough to allow owls to fly within and beneath it."

Fifteen years later, the conclusions of the Interagency Scientific Committee were echoed in the Scientific Evaluation of the Status of the Northern Spotted Owl (Courtney et al. 2004), which found that the habitat attributes identified by Thomas et al. (1990) remain important components of spotted owl habitat. Notably, positive relationships were found with the aforementioned attributes whether the samples of spotted owl and random locations were within old-growth forest, non-old growth forest on National Parks, public or private land. In 2011, the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011) again reiterated the association of spotted owls with older forest conditions, stating: "Spotted owls generally rely on older forested habitats (Carroll and Johnson 2008) because such forests contain the structures and characteristics required for nesting, roosting, and foraging (NRF)."

Spatial Use of Forest Landscapes

A major advance in our understanding of spotted owl habitat relationships from Thomas et al. (1990) to the present is that we now have a much better understanding of the spatial scale of habitat selection (Hunter et al. 1995, Meyer et al. 1998, Zabel et al. 2003, Weins et al. 2014) and the relationships of habitat to spotted owl fitness (Franklin et al. 2000, Olson et al. 2004, Dugger et al. 2005, Weins et al. 2014). Generally, guidance for management activities addressing territorial organisms is spatially explicit and such activities are applied to an area corresponding to the movements and activity patterns of the individuals occupying the territory or territories. Spotted owls are territorial predators that range widely in search of food but are 'anchored' during the breeding season to a nest site (Rosenberg and McKelvey 1999). That is, spotted owls are central-place foragers. Foraging close to the nest reduces travel time and energetic expenditures of adults and also increases the ability of the adults to remain nearby and protect their young. Several studies have shown that the selection of nest sites by spotted owls is related to the amount of older forest habitat at multiple spatial scales (Ripple et al. 1991, Ripple et al. 1997, Swindle et al. 1999, and Perkins 2000). Based on this research, evaluations of spotted owl use of an area appear to be most meaningful at two spatial scales: 1) the home range and 2) the core area. Habitat selection at a larger home range scale is likely dependent on habitat selection at the smaller core area (Johnson 1980 for hierarchy of habitat selection).

The home range is the "area traversed by the individual in its normal activities of food gathering, mating, and caring for young" (Burt 1943:351). Within home ranges, areas receiving concentrated use, typically surrounding the nest site and favored foraging areas, are called core areas (Bingham and Noon 1997). Establishing the exact spatial extent of a spotted owl's home range and core area based on relative use within a home range typically requires use of radio-telemetry. Because of the intensity and high cost of radio-telemetry, action agencies are generally not able to conduct this type of study for specific projects. Therefore, for purposes of assessing a project's potential impacts to the spotted owl, circles centered on spotted owl nest sites or activity centers that approximate the median core areas and home range areas of spotted owls monitored in previous radio telemetry studies (see home range estimates in Thomas et al. 1990 and reaffirmed in Courtney et al. 2004) will be used unless more specific information is available.

These circles serve as proxies for the area where the amount and configuration of habitat has been shown to affect occupancy, survival, reproduction, and related fitness. Local data from the HJ Andrews demography study and other local information from the Willamette Province were used to determine home range and core area configurations to evaluate effects to spotted owls in this consultation.

Resources such as food availability as well as breeding and resting sites can be distributed in patches on heterogeneous landscapes, such as those prevalent throughout the Northwest Forest Plan (NWFP) provinces. In such landscapes, animals are likely to disproportionately use areas that contain relatively higher densities of important resources (Powell 2000), with concentrated use close to their nests. These disproportionately used areas are referred to as "core areas" (Bingham and Noon 1997). Thomas et al. (1990) found that amounts of suitable habitat within 0.7 miles (986 acres) of spotted owl activity centers were important to spotted owl life history functions, and the amount of suitable habitat around nest sites was significantly greater than the amount of suitable spotted owl habitat in random circles. The findings of Thomas et al. (1990) illustrate the importance of the amount of suitable habitat within a spotted owl territory to support the life history requirements of the spotted owl. The results of subsequent studies (see below) also indicated that a 0.5-mile radius circular area encompassing 500 acres around spotted owl activity centers is likely a more appropriate scale at which to evaluate the amounts of suitable habitat required by breeding spotted owls (USFWS 2009 and USFWS 2011 Appendix C). These studies relied on three primary sources of information to support the 500-acre core area size: (1) the distribution of locations of radio-telemetered spotted owls; (2) the territorial spacing patterns of spotted owls; and (3) the results of studies comparing relative habitat selection by spotted owls at different scales.

The Willamette Planning Province Level 1 team uses circles as surrogates for approximating spotted owl home range and core areas to inform impacts to the species. It is recognized that spotted owls may adjust the shape of their home ranges to encompass as much older forest habitat as possible (Carey et al. 1992). As such, the use of circles may not exactly overlap with actual areas used by spotted owls. The latter may be defined by other factors such as topographic features (e.g., drainages), abundance and availability of prey species, and the distribution and/or abundance of competitors and predators (Anthony and Wagner 1998; Courtney et al. 2004). However, the practice of using circles has a biological basis (Lehmkuhl and Raphael 1993), and has been utilized by many researchers to provide a uniform method for quantifying (comparing/contrasting) spotted owl habitat (Thomas et al. 1990; Ripple et al. 1991; Lehmkuhl and Raphael 1993; Ripple et al. 1997; Swindle et al. 1999; Perkins 2000; Franklin et al. 2000; Olson et al. 2004; Dugger et al. 2005, and summary in Courtney et al. 2004). The use of circles also seems appropriate for species, like the spotted owl, characterized as a central place species.

The following estimates by NWFP Province help inform a spotted owl spatial analysis for Oregon: Coast Ranges Province = 4,524 acres or a circle with a 1.5-mile radius; West Cascades Province = 2,895 acres or a circle with a 1.2-mile radius; and the Klamath Province = 3,398 acres or a circle with a 1.3- mile radius. Within a home range, the smaller core-use area estimate of 500 acres or a circle with a 0.5 mile radius inform the spotted owl core-use area analysis for each of the aforementioned provinces (Thomas et al. 1990; USFWS 1992; Carey et al. 1992; Anthony and Wagner 1998; Irwin et al. 2000; Courtney et al. 2004; Glenn et al. 2004; UFWS 2011). In general for analysis purposes, the core-use/home range area circle(s) will be centered on a spotted owl activity center that represents the area that spotted owls are likely to use for nesting and foraging in any given year. Where available, local information on home range and core use areas is used, recognizing that circles are rough proxies and their value is that the amount and configuration of habitat within those radii has been shown to affect occupancy, survival, reproduction, and related fitness.

Habitat Availability in Core Areas and Home Ranges

Core Area

The best available information to date indicates that spotted owl survival and fitness are positively correlated with large patch sizes of older forest or large forest patches containing a high proportion of older forest (Franklin et al. 2000, Olson et al. 2004 and Dugger et al. 2005, Weins et al. 2014). Habitat-based fitness, or habitat fitness potential (HFP), is the "fitness conferred on an individual occupying a territory of certain habitat characteristics" (Franklin et al. 2000). HFP is a function of both the survival and reproduction of individuals within a given territory. For example, the datasets analyzed by Franklin et al. (2000) were re-analyzed to evaluate the relationship between HFP and the simple proportion of older forest within spotted owl core areas. The results of that analysis (USFWS 2007, pp. 134-136), indicate a quadratic relationship between spotted owl HFP and older forest conditions, with optimum HFP occurring when 53 percent of the estimated core area consisted of older forest (Franklin et al. 2000). More than half (55 percent) of the high-quality[1] spotted owl territories had core areas comprised of 50 to 65 percent older forest. In a similar study in southern Oregon, Dugger et al. (2005) found that spotted owl HFP was positively related to the proportion of older forest in the core area, although the strength of the relationship decreases with increased proportions. Roughly 72 percent of core areas with a HFP greater than 1.0 had more than 50 percent older forest, whereas core areas with a HFP of less than 1.0 never contained more than 50 percent older forest.

Mean percent cover of old forest within spotted owl core areas in southwest Oregon and northwest California have varied widely among studies (about 35 to 60 percent) (Hunter et al. 1995; Ripple et al. 1997; Gutiérrez et al.. 1998; Meyer et al. 1998; Franklin et al. 2000; Dugger et al. 2005). It is difficult to assess how much of this variation was due to differences in ecological setting, spatial scale, habitat classification, and individual variation among owls. Nonetheless, the central tendency of these results was roughly 50-60 percent older forest habitat within spotted owl core areas.

Home Range

Bart (1995) evaluated the suggestion in the 1992 draft recovery plan for the spotted owl (USFWS 1992) that at least 40 percent of the estimated home range be retained as suitable habitat. Using demographic data from throughout the spotted owl's range,

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1 HFP greater than 1

including Oregon, Bart (1995) calculated that spotted owl populations are stable when the average proportion of nesting, roosting and forage[2] habitat in the home range is 30 to 50 percent. In the Oregon Coast Ranges, Olson et al. (2004) found that spotted owl occupancy was positively correlated with the amount of mid and late-seral forest. Spotted owl demography and the presence of spotted owls appear to be positively associated with an intermediate amount of horizontal heterogeneity in forest habitat at the home range scale (Schilling et al. 2013). Findings reported in more recent papers (see USFWS 2009) have been consistent with those of Bart (1995). Weins et al. (2014) found a positive relationship between the six month survival rate of spotted owls and the percent of older forest in the individual home range.

2 Nesting, roosting, forage habitat is called “suitable” habitat in this document.

Site Occupancy

Habitat-based assessments and/or modeling have been used in various studies to estimate the presence (occupancy) of breeding spotted owls. These tools are important for evaluating the species-habitat relationships. Bart (1995) reported that occupied spotted owl core areas contained at least 30 to 50 percent mature and old growth forest. Spotted owl demographic performance, particularly occupancy, increases with increasing amounts of suitable habitat in the core area. Meyer et al. (1998) examined landscape indices associated with spotted owl sites versus random plots on BLM lands throughout Oregon. Across provinces, landscape indices highly correlated with the probability of spotted owl occupancy included 30 percent or more older forest within the 500 acres surrounding the site[3] and that site occupancy decreased following the harvest of suitable habitat in the vicinity of the core area. In their northwest California study area, Zabel et al. (2003) found that the highest probability of spotted owl occupancy occurred when the core area was comprised of 69 percent nesting/roosting habitat. Stepping up to the larger home range scale, Thomas et al. (1990), Bart and Forsman (1992), Bart (1995), Olson et al. 2004, and Dugger et al. (2005) suggest that when spotted owl home ranges included less than 40 to 60 percent nesting, roosting and forage habitat, they were more likely to have lower occupancy and fitness.

Many different combinations of forest habitat structure and amount at various spatial scales may support viable spotted owl territories sufficient for the survival and reproduction of individual owls. Despite consistent patterns of habitat selection by spotted owls, structural conditions of forest habitats occupied by spotted owls are highly variable. However, overall, the best available information suggests that: (1) the probability of spotted owls occupying a given patch of forest habitat increases when core areas contain a range of forest habitat conditions that support the essential life history requirements of individual spotted owls; and (2) the survival and fitness of spotted owls are positively correlated with larger patch sizes of older forest or larger patches of forest habitat with a high proportion of older forest (Franklin et al. 2000; Olson et al. 2005; Dugger et al. 2005).

3 This predictive value decreased with increasing distance from the site.

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Spotted Owl Habitat at Known and Potential Site Scales

This consultation uses the areas of home range, core area, and nest patch depicted in Table F-1 to determine effects of activities to known sites and to delineate and determine effects within potential sites.

As shown in Table F-1, this consultation uses the established 1.2 mile radius home range (also referred to as provincial home range), 0.5 mile radius core area, and 300 meter nest patch distances appropriate within the Willamette Planning Province. Known sites are also referred to as “spotted owl sites” in this document. The described analytical process, including all effects determinations, was developed to assess the effects of proposed federal actions in the Willamette Planning Province evaluated in this document. This consultation is not intended to represent mandatory guidance or be applicable to other planning provinces or future consultations.

Table F- 1. Size of home range, core area and estimated nest patch in the Willamette Planning Province

Province	Median Home Range Radius and Area	Mean Core Area Radius and Area	Estimated Nest Patch Radius and Area
Willamette Planning Province Oregon Cascades	1.2 miles ≈ 2,955 acres (Forsman et al. 1984 pp. 18 & 20; Meslow and Miller, 1989, p. 2; Thomas et al. 1990 p. 194, Table I1; USDA & USDI, 1994, p.12)	0.5 mile = 500 acres Swindle et al. 1999; Irwin et al. 2000, 2005	300 meters = 70 acres Swindle et al. 1999; Perkins et al. 2000
	40% = 1,182 acres	50% = 250 acres	100% = 70 acres

Home Range (1.2 mile radius or about 2,955 acres)

The home range represents a minimum area for spotted owls to carry out all life history needs, particularly during the nesting season. The home range for Willamette Planning Province has been described in Forsman et al, 1984, pp. 18 & 20; Meslow and Miller, 1989, p. 2; Thomas et al. 1990 p. 194; USDA & USDI, 1994, p.12. This is supported by later researchers such as Wiens et al. (2014). The home range surrounds the nest patch and core area and, barring more site specific information (e.g., habitat type and orientation), was delineated using a 1.2 mile radius circle.

Core Area (0.5 mile radius or 503 acres)

The core area represents the area most heavily used during the nesting season for nesting, foraging and rearing young. Bingham & Noon (1997) defined the core area as that portion of a spotted owl home range that received disproportionately high use for nesting, roosting and access to prey. Although Courtney et al. (2004:5-5) observed that core area sizes varied greatly among spotted owls, Bingham & Noon (1997), Wagner & Anthony (1999), Franklin et al. (2000) and Irwin et al. (2000) collectively suggested a core area of about 500 acres. The core area surrounds a nest patch and is located in the best available habitat that is likely to support concentrated use for nesting, roosting and rearing of young during the nesting season. Barring more site specific information (e.g., habitat type and orientation), this area was delineated using a 0.5 mile radius circle.

Nest Patch (300 meters or 70 acres)

The nest patch represents an area where a spotted owl would be likely to select a nest tree or trees. This is based on habitat usage of spotted owls within the Central Cascades Study Area, located on the Willamette National Forest. Nest patch size has been shown to be an important attribute for site selection by spotted owls. More specifically, models developed by Swindle et al. (1997) and Perkins (2000) showed that the 200-300 meter radius (sometimes greater) encompassing approximately 75 acres around a Nest Patch is important to spotted owls. Having as much of the 300 meter radius in suitable habitat was critical to nest position on the landscape. Miller (1989) found that, on average, the extent of forested area used by juvenile spotted owls prior to dispersal averaged approximately 70 acres.

Meyer et al. (1998) found that old-growth patch size (i.e., larger patches) was strongly related to spotted owl site selection in Oregon. In reviewing the results of Table 5-2 (Courtney et al. 2004), it appears that spotted owls select nest sites on the landscape to maximize the amount of older forest habitat near the nest (USFWS, 2005).

Known site centers and corresponding nest patches are based on nest trees or pair activity centers. Potential site centers and nest patches are located in the best available habitat likely to facilitate spotted owl nesting by providing suitable nest trees and forage habitat for rearing of young immediately after leaving the nest tree. Potential site center locations considered the typical nearest neighbor distance (see Table 3) to nearby known and potential sites, and avoidance of barred owl “core use areas,” when this information was available. Barring more site specific information, (e.g., habitat type and orientation), this area was delineated using a 300 meter radius circle.

Potential Site (1.2 miles or about 2,955 acres)

This consultation uses the term “potential sites” to describe areas equivalent to the home range for known sites that support breeding spotted owls based on habitat conditions, but where surveys are nonexistent, outdated or otherwise insufficient to establish known sites. Potential sites are an analytical concept to address “potential spotted owl sites” and, when applicable, "unsurveyed habitat" used in the Revised Recovery Plan for the Northern Spotted Owl (U.S. Fish and Wildlife Service, 2011; "Recovery Plan"). The Recovery Plan excerpts below reflect an approach to define and manage for potentially occupied areas outside of known sites as part of the spotted owl recovery strategy.

"In unsurveyed spotted owl habitat, the agencies and the Service should work cooperatively through the Endangered Species Act consultation process to minimize impacts to potential spotted owl sites" (p. III-45);

"There is a wide breadth of spotted owl occupancy data throughout the species' range. Where spotted owl occupancy data are unavailable (e.g., unsurveyed habitat), land managers have a variety of tools to assist in determining where likely occupied habitat is and how to implement this recovery action, including assumption of occupancy (a common practice during section 7 consultation), surveys, spotted owl modeling results, forest stand data, etc." (p. III-46);

"Spotted Owl Site: Any location where territorial spotted owls are known to be present, were historically present, or may be present in unsurveyed habitat. Spotted owl sites can be identified through surveys where spotted owls were detected (USFWS 2010). In cases where survey data are unavailable, spotted owl sites can be identified by 1) conducting surveys, or 2) using a modeling approach that uses habitat and landscape characteristics to identify areas with a high probability of being occupied by spotted owls."(p. G-4).

Potential Site Delineation

Potential sites could support breeding spotted owl pairs and management of such areas is recommended in the Recovery Plan. Therefore, this consultation recognizes the need for the delineation and analysis of potential sites to determine the effects of proposed activities. Potential site delineation is based on guidance in the Recovery Plan, decades of knowledge acquired from spotted owl surveys, and the best commercial and scientific information available. Spotted owl habitat associations and habitat requirements for reproduction were considered. Collectively, this information constitutes a synthesis of the best available science that was used to develop the general analytical framework described below.

Assessment of habitat within the home range, core area, and nest patch scales considered habitat quality, amount, orientation, contiguity and interior forest conditions, as well as specific spotted owl life history needs within each of these three scales (e.g., nest patches contain known or potential suitable nest trees). This information was used to evaluate and determine if an area possessed the characteristics that could support spotted owls. Habitat age and function was assessed by unit biologists using a variety of best available information such as agency forest operations inventory data, MaxEnt modeling, Lidar or other suitable aerial imagery or modeling. When necessary, field examination was also conducted to accurately evaluate habitat type. In all cases, area-specific conditions were assessed and the best available information was utilized in delineating a potential site.

Survey data, when available, also provided known or probable locations of spotted owls within known or potential sites.

A general outline of the process used follows:

- Geographic areas beyond 1.2 miles from known or potential site centers were identified. This value represents the median distance between known sites within the Central Cascades Demographic Study Area, commonly called the "nearest neighbor" distance.
- Within such areas, spotted owl habitat was identified and mapped. It was then determined if there was sufficient habitat quality, amount and spatial orientation to identify a potential site center. A consideration was that amount and quality of habitat present should be able to support a resident pair. Potential sites should also be able to support reproductive resident pairs. Ideally these areas would be close to or above thresholds which the literature indicates is necessary for successful reproduction (suitable habitat of approximately 40% or more in the home range and 50% or more in the core area with adequate habitat in the nest patch to support a nesting pair). Where available, site specific data were used to adjust these thresholds to more closely reflect actual conditions on the ground in the localized area. Local survey data were also used to establish or refine potential site locations. Based on local conditions, potential sites were delineated in some situations where habitat may be below the previously described thresholds. For example, where survey data indicated that owls could be residing in the area, or where nearby known sites occupied by spotted owls exhibited similar type, quality and quantity of habitat.
- Proposed management activity locations were examined to see if they would be within the home range of an existing known or potential site. If so, effects were determined based on the general analytical framework described in this consultation.

Potential site center locations considered the typical nearest neighbor distance to nearby known and potential sites and avoidance of barred owl core use areas, if known. The "nearest neighbor" distance of 1.2 miles was used as a minimum spacing between new potential sites and nearby known or potential sites.

Potential site centers and their nest patches were located in the best available habitat likely to facilitate spotted owl nesting by providing suitable nest trees and forage habitat for rearing of young immediately after leaving the nest tree. Barring more site specific information, (e.g., habitat type and orientation), the nest patch was delineated using a 300 meter radius circle. Potential site core areas were located in the best available habitat likely to support concentrated use for nesting, roosting and rearing of young during the entire nesting season. Barring more site specific information (e.g., habitat type and orientation), this area was delineated using a 0.5 mile radius circle.

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APPENDIX E: Spotted Owl and Spotted Owl Critical Habitat Range-wide Baselines

In 2016 the BLM in Oregon revised their RMPs for their lands within the area covered by the NWFP (BLM 2016a, 2016b). While the management of these BLM lands is consistent with the conservation and recovery objectives of the NWFP for threatened and endangered species, the management direction is not identical with the standards and guidelines of the NWFP. Where in this document we refer to the NWFP, we mean the BLM RMPs covered by the 2016 RODs and all other Federal lands covered by the NWFP framework.

STATUS OF THE SPECIES - NORTHERN SPOTTED OWL

Legal Status

The spotted owl was listed as threatened on June 26, 1990 due to widespread loss and adverse modification of suitable habitat across the owl's entire range and the inadequacy of existing regulatory mechanisms to conserve the owl (USFWS 1990a, p. 26114). The northern spotted owl was originally listed with a recovery priority number of 3C, but that number was changed to 6C in 2004 during the 5-year review of the species (USFWS 2004, p. 55). Priority numbers are assigned on a scale of 1C (highest) to 18 (lowest). This number reflects a high degree of threat, a low potential for recovery, and the owl's taxonomic status as a subspecies (USFWS 1983b, p. 51895). The "C" reflects conflict with development, construction, or other economic activity (USFWS 1983a, p. 43104). The most recent five year status review was completed on September 29, 2011, and did not propose changes to the listing status or introduce any new threats (USFWS 2011a). In 2012, the Service was petitioned to uplist the northern spotted owl from threatened to endangered status under the Endangered Species Act. In April 2015, the Service determined that petition presented substantial information indicating that the listing may be warranted due to a number of listing factors (USFWS 2015).

Life History

Taxonomy

The northern spotted owl is one of three subspecies of spotted owls currently recognized by the American Ornithologists' Union. The taxonomic separation of these three subspecies is supported by genetic (Barrowclough and Gutiérrez 1990, pp.741-742; Barrowclough *et al*. 1999, p. 928; Haig *et al*. 2004, p. 1354), morphological (Gutiérrez *et al*. 1995, p. 2), and biogeographic information (Barrowclough and Gutiérrez 1990, p.741-742). The distribution of the Mexican subspecies (*S. o. lucida*) is separate from those of the northern and California (*S. o. occidentalis*) subspecies (Gutiérrez *et al*. 1995, p.2). Recent studies analyzing mitochondrial DNA sequences (Haig *et al*. 2004, p. 1354; Chi *et al*. 2004, p. 3; Barrowclough *et al*. 2005, p. 1117) and microsatellites (Henke *et al*., unpublished data, p. 15) confirmed the validity of the current subspecies designations for northern and California spotted owls. The narrow hybrid zone between these two subspecies, which is located in the southern Cascades and northern Sierra Nevada, appears to be stable (Barrowclough *et al*. 2005, p. 1116).

Funk *et al*. (2008, pp. 1-11) tested the validity of the three current recognized subspecies of spotted owls and found them to be valid. During this genetics study, bi-directional hybridization and dispersal between northern spotted owls and California spotted owls centered in southern Oregon and northern California was discovered. In addition, a discovery of intro-regression of Mexican spotted owls into the northernmost parts of the northern spotted owl populations in Washington was made, indicating long-distance dispersal of Mexican spotted owls into the northern spotted owl range (Funk *et al*. 2008, pp. 1-11). Some hybridization of northern spotted owls with barred owls has been recorded (Hamer *et al*. 1994, pp. 487-491; Dark *et al*. 1998, pp. 50-56; Kelly 2001, pp. 33, 38).

Physical Description

The northern spotted owl is a medium-sized owl and is the largest of the three subspecies of spotted owls (Gutiérrez *et al*. 1995, p. 2). It is approximately 46 to 48 centimeters (18 inches to 19 inches) long and the sexes are dimorphic, with males averaging about 13 percent smaller than females. The mean mass of 971 males taken during 1,108 captures was 580.4 grams (1.28 pounds) (out of a range 430.0 to 690.0 grams) (0.95 pound to 1.52 pounds), and the mean mass of 874 females taken during 1,016 captures was 664.5 grams (1.46 pounds) (out of a range 490.0 to 885.0 grams) (1.1 pounds to 1.95 pounds) (P. Loschl and E. Forsman, pers. comm. as cited in USFWS 2011b, p. A-1). The northern spotted owl is dark brown with a barred tail and white spots on its head and breast, and it has dark brown eyes surrounded by prominent facial disks. Four age classes can be distinguished on the basis of plumage characteristics (Forsman 1981; Moen *et al*. 1991, p. 493). The northern spotted owl superficially resembles the barred owl, a species with which it occasionally hybridizes (Kelly and Forsman 2004, p. 807). Hybrids exhibit physical and vocal characteristics of both species (Hamer *et al*. 1994, p. 488).

Current and Historical Range

The current range of the spotted owl extends from southwest British Columbia through the Cascade Mountains, coastal ranges, and intervening forested lands in Washington, Oregon, and California, as far south as Marin County (USFWS 1990a, p. 26115). The range of the spotted owl is partitioned into 12 physiographic provinces (see Figure 2) based on recognized landscape subdivisions exhibiting different physical and environmental features (Thomas *et al*. 1993, USFWS 2011b, p. III-1). These provinces are distributed across the species' range as follows:

- Four provinces in Washington: Eastern Washington Cascades, Olympic Peninsula, Western Washington Cascades, Western Washington Lowlands
- Five provinces in Oregon: Oregon Coast Range, Willamette Valley, Western Oregon Cascades, Eastern Oregon Cascades, Oregon Klamath
- Three provinces in California: California Coast, California Klamath, California Cascades

The spotted owl is extirpated or uncommon in certain areas such as southwestern Washington and British Columbia. Timber harvest activities have eliminated, reduced or fragmented spotted owl habitat sufficiently to decrease overall population densities across its range, particularly within the coastal provinces where habitat reduction has been concentrated (Thomas and Raphael 1993, USFWS 2011b, pp. B-1 to B-4;).

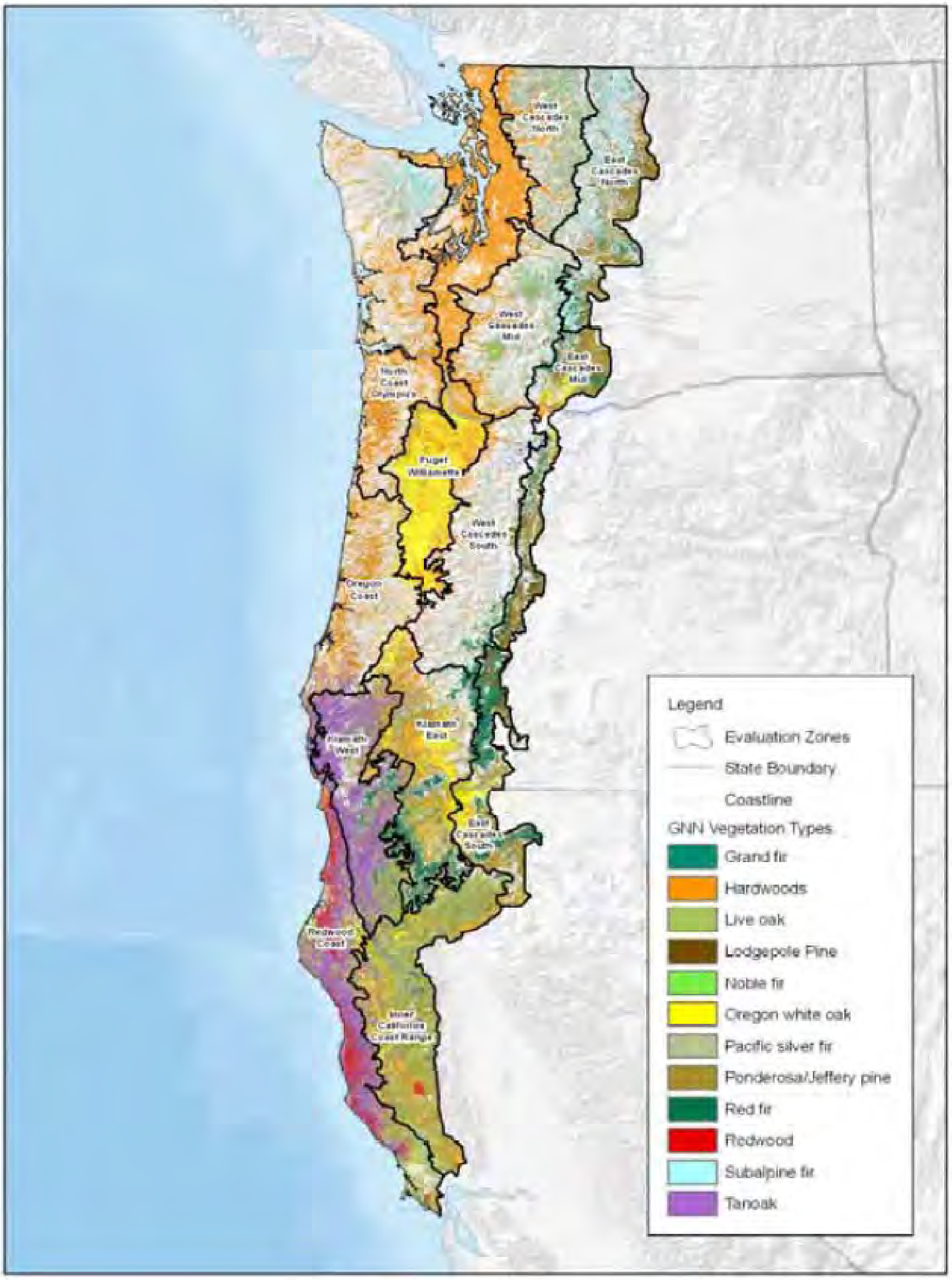

Figure 2. Physiographic provinces within the range of the northern spotted owl.

Behavior

Northern spotted owls are primarily nocturnal (Forsman *et al*. 1984, pp. 51-52) and spend virtually their entire lives beneath the forest canopy (Courtney *et al*. 2004, p. 2-5). They are adapted to maneuverability beneath the forest canopy rather than strong, sustained flight (Gutiérrez *et al*. 1995, p. 9). They forage between dusk and dawn and sleep during the day with peak activity occurring during the two hours after sunset and the two hours prior to sunrise (Gutiérrez *et al*. 1995, p. 5; Delaney *et al*. 1999, p. 44). They will sometimes take advantage of vulnerable prey near their roosts during the day (Layman 1991, pp. 138-140; Sovern *et al*. 1994, p. 202).

Northern spotted owls seek sheltered roosts to avoid inclement weather, summer heat, and predation (Forsman 1975, pp. 105-106; Barrows and Barrows 1978; Barrows 1981; Forsman *et al*. 1984, pp. 29-30). Northern spotted owls become stressed at temperatures above 28°C, but there is no evidence to indicate that they have been directly killed by temperature because of their ability to thermoregulate by seeking out shady roosts in the forest understory on hot days (Barrows and Barrows 1978; Forsman *et al*. 1984, pp. 29-30, 54; Weathers *et al*. 2001, pp. 678, 684). During warm weather, spotted owls seek roosts in shady recesses of understory trees and occasionally will even roost on the ground (Barrows and Barrows 1978, pp. 3, 7-8; Barrows 1981, pp. 302-306, 308; Forsman *et al*. 1984, pp. 29-30, 54; Gutiérrez *et al*. 1995, p. 7). Glenn *et al*. (2010, p. 2549) found that population growth was negatively associated with hot summer temperatures at their southernmost study area in the southern Oregon Cascades, indicating that warm temperatures may still have an effect on the species. Both adults and juveniles have been observed drinking water, primarily during the summer, which is thought to be associated with thermoregulation (Gutiérrez *et al*. 1995, p. 7).

Spotted owls are territorial; however, home ranges of adjacent pairs overlap (Forsman *et al*. 1984, p. 22; Solis and Gutiérrez 1990, p. 746) suggesting that the area defended is smaller than the area used for foraging. They will actively defend their nests and young from predators (Forsman 1975, p. 15; Gutiérrez *et al*. 1995, p. 11). Territorial defense is primarily effected by hooting, barking and whistle type calls. Some spotted owls are not territorial but either remain as residents within the territory of a pair or move among territories (Gutiérrez 1996, p. 4). These birds are referred to as "floaters." Floaters have special significance in spotted owl populations because they may buffer the territorial population from decline (Franklin 1992, p. 822). Little is known about floaters other than that they exist and typically do not respond to calls as vigorously as territorial birds (Gutiérrez 1996, p. 4).

Spotted owls are monogamous and usually form long-term pair bonds. "Divorces" occur but are relatively uncommon. There are no known examples of polygyny in this owl, although associations of three or more birds have been reported (Gutiérrez *et al*. 1995, p. 10).

Habitat Relationships

Home Range

Home-range sizes vary geographically, generally increasing from south to north, which is likely a response to differences in habitat quality (USFWS 1990a, p. 26117). Estimates of median size of their annual home range (the area traversed by an individual or pair during their normal activities (Thomas and Raphael 1993, pp. IX-15)) vary by province and range from 2,955 acres in the Oregon Cascades (Thomas *et al*. 1990, p. 194) to 14,211 acres on the Olympic Peninsula (USFWS 1994a, p. 3). Zabel *et al*. (1995, p. 436) showed that these provincial home ranges are larger where flying squirrels are the predominant prey and smaller where wood rats are the predominant prey. Home ranges of adjacent pairs overlap (Forsman *et al*. 1984, p. 22; Solis and Gutiérrez 1990, p. 746), suggesting that the defended area is smaller than the area used for foraging. Within the home range there is a smaller area of concentrated use during the breeding season (approximately 20 percent of the home range), often referred to as the core area (Bingham and Noon 1997, pp. 133-135). Spotted owl core areas vary in size geographically and provide habitat elements that are important for the reproductive efficacy of the territory, such as the nest tree, roost sites and foraging areas (Bingham and Noon 1997, p. 134). Spotted owls use smaller home ranges during the breeding season and often dramatically increase their home range size during fall and winter (Forsman *et al*. 1984, pp. 21-22; Sisco 1990, p. iii).

Although differences exist in natural stand characteristics that influence home range size, habitat loss and forest fragmentation effectively reduce habitat quality in the home range. A reduction in the amount of suitable habitat reduces spotted owl abundance and nesting success (Bart and Forsman 1992, pp. 98-99; Bart 1995, p. 944).

Habitat Use and Selection

Forsman *et al*. (1984, pp.15-16) reported that spotted owls have been observed in the following forest types: Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), grand fir (*Abies grandis*), white fir (*A. concolor*), ponderosa pine (*Pinus ponderosa*), Shasta red fir (*A. magnifica shastensis*), mixed evergreen, mixed conifer hardwood (Klamath montane), and redwood (*Sequoia sempervirens*). The upper elevation limit at which spotted owls occur corresponds to the transition to subalpine forest, which is characterized by relatively simple structure and severe winter weather (Forsman 1975, p. 27; Forsman *et al*. 1984, pp. 15-16).

Spotted owls generally rely on older forested habitats because such forests contain the structures and characteristics required for nesting, roosting, and foraging. Features that support nesting and roosting typically include a moderate to high canopy cover (60 to 90 percent); a multi-layered, multi-species canopy with large overstory trees (with diameter at breast height [dbh] of greater than 30 inches); a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly (Thomas *et al*. 1990, p. 19). Forested stands with high canopy cover also provide thermal cover (Weathers *et al*. 2001, p. 686) and protection from predators (Franklin *et al*. 2000, p. 578).

Spotted owls nest almost exclusively in trees. Like roosts, nest sites are found in forests having complex structure dominated by large diameter trees (Forsman *et al*. 1984, p. 30; Hershey *et al*. 1998, p. 1402). Even in forests that have been previously logged, spotted owls select forests having a structure (*i.e*., larger trees, greater canopy cover) different than forests generally available to them (Folliard 1993, p. 40; Buchanan *et al*. 1995, p. 1402; Hershey *et al*. 1998, p. 1404).

Roost sites selected by spotted owls have more complex vegetation structure than forests generally available to them (Barrows and Barrows 1978, p. 3; Forsman *et al*. 1984, pp. 29-30; Solis and Gutiérrez 1990, pp. 742-743). These habitats are usually multi-layered forests having high canopy cover and large diameter trees in the overstory.

Foraging habitat is the most variable of all habitats used by territorial spotted owls (Thomas *et al*. 1990; USFWS 2011b, p. G-2). Descriptions of foraging habitat have ranged from complex structure (Solis and Gutiérrez 1990, pp. 742-744) to forests with lower canopy cover or cover and smaller trees than forests containing nests or roosts (Gutiérrez 1996, p. 5). Foraging habitat for spotted owls provides a food supply for survival and reproduction. Foraging activity is positively associated with tree height diversity (North *et al*. 1999, p. 524), canopy cover or cover (Irwin *et al*. 2000, p. 180; Courtney *et al*. 2004, pp. 5-15), snag volume, density of snags greater than 20 in (50 cm) dbh (North *et al*. 1999, p. 524; Irwin *et al*. 2000, pp. 179-180; Courtney *et al*. 2004, pp. 5-15), density of trees greater than or equal to 31 in (80 cm) dbh (North *et al*. 1999, p. 524), volume of woody debris (Irwin *et al*. 2000, pp. 179-180), and young forests with some structural characteristics of old forests (Carey *et al*.1992, pp. 245-247; Irwin *et al*. 2000, pp. 178-179). Spotted owls select old forests for foraging in greater proportion than their availability at the landscape scale (Carey *et al*. 1992, pp. 236-237; Carey and Peeler 1995, p. 235; Forsman *et al*. 2004, pp. 372-373), but will forage in younger stands with high prey densities and access to prey (Carey *et al*. 1992, p. 247; Rosenberg and Anthony 1992, p. 165; Thome *et al*. 1999, pp. 56-57).

Dispersal habitat is essential to maintaining stable populations by filling territorial vacancies when resident spotted owls die or leave their territories, and to providing adequate gene flow across the range of the species. Dispersal habitat, at a minimum, consists of stands with adequate tree size and canopy cover to provide protection from avian predators and at least minimal foraging opportunities (USFWS 2011b, p. G-1). Dispersal habitat may include younger and less diverse forest stands than foraging habitat, such as even-aged, pole-sized stands, but such stands should contain some roosting structures and foraging habitat to allow for temporary resting and feeding for dispersing juveniles (USFWS 2011b, p. G-1). Forsman *et al*. (2002, p. 22) found that spotted owls could disperse through highly fragmented forest landscapes. In a study of the natal dispersal of spotted owls, Sovern *et al*. (2015, pp. 257-260) found the majority of roosts were in forested habitats with at least some large (>50 cm dbh) trees and they selected stands with high canopy cover (>70 percent) at the landscape scale. These authors suggested the concept of ‘dispersal’ habitat as a lower quality type of habitat may be inappropriate. The stand-level and landscape-level attributes of forests needed to facilitate successful dispersal have not been thoroughly evaluated (Buchanan 2004, p. 1341).

Spotted owls may be found in younger forest stands that have the structural characteristics of older forests or retained structural elements from the previous forest. In redwood forests and mixed conifer-hardwood forests along the coast of northwestern California, considerable numbers of spotted owls also occur in younger forest stands, particularly in areas where hardwoods provide a multi-layered structure at an early age (Thomas *et al*. 1990, p. 158; Diller and Thome 1999, p. 275). In mixed conifer forests in the eastern Cascades in Washington, 27 percent of nest sites were in old-growth forests, 57 percent were in the understory reinitiation phase of stand development, and 17 percent were in the stem exclusion phase (Buchanan *et al*. 1995, p. 304). In the western Cascades of Oregon, 50 percent of spotted owl nests were in late-seral/old-growth stands (greater than 80 years old), and none were found in stands of less than 40 years old (Irwin *et al*. 2000, p. 41).

In the Western Washington Cascades, spotted owls roosted in mature forests dominated by trees greater than 50 centimeters (19.7 inches) dbh with greater than 60 percent canopy cover more often than expected for roosting during the non-breeding season. Spotted owls also used young forest (trees of 20 to 50 centimeters (7.9 inches to 19.7 inches) dbh with greater than 60 percent canopy cover) less often than expected based on this habitat's availability (Herter *et al*. 2002, p. 437).

In the Coast Ranges, Western Oregon Cascades and the Olympic Peninsula, radio-marked spotted owls selected old-growth and mature forests for foraging and roosting and used young forests less than predicted based on availability (Forsman *et al*. 1984, pp. 24-25; Carey *et al*. 1990, pp. 14-15; Thomas *et al*. 1990; Forsman *et al*. 2005, pp. 372-373). Glenn *et al*. (2004, pp. 46-47) studied spotted owls in young forests in western Oregon and found little preference among age classes of young forest.

Habitat use is influenced by prey availability. Ward (1990, p. 62) found that spotted owls foraged in areas with lower variance in prey densities (that is, where the occurrence of prey was more predictable) within older forests and near ecotones of old forest and brush seral stages. Zabel *et al*. (1995, p. 436) showed that spotted owl home ranges are larger where flying squirrels (*Glaucomys sabrinus*) are the predominant prey and smaller where wood rats (*Neotoma* spp.) are the predominant prey.

Recent landscape-level analyses in portions of Oregon Coast and California Klamath provinces suggest that a mosaic of late-successional habitat interspersed with other seral conditions may benefit spotted owls more than large, homogeneous expanses of older forests (Zabel *et al*. 2003, p. 1038; Franklin *et al*. 2000, pp. 573-579; Meyer *et al*. 1998, p. 43). In Oregon Klamath and Western Oregon Cascade provinces, Dugger *et al*. (2005, p. 876) found that apparent survival and reproduction was positively associated with the proportion of older forest near the territory center (within 730 meters) (2,395 feet). Survival decreased dramatically when the amount of non-habitat (non-forest areas, sapling stands, etc.) exceeded approximately 50 percent of the home range (Dugger *et al*. 2005, pp. 873-874). The authors concluded that they found no support for either a positive or negative direct effect of intermediate-aged forest—that is, all forest stages between sapling and mature, with total canopy cover greater than 40 percent—on either the survival or reproduction of spotted owls. It is unknown how these results were affected by the low habitat fitness potential in their study area, which Dugger *et al*. (2005, p. 876) stated was generally much lower than those in Franklin *et al*. (2000) and Olson *et al*. (2004), and the low reproductive rate and survival in their study area, which they reported were generally lower than those studied by Anthony *et al*. (2006). Olson *et al*. (2004, pp. 1050-1051) found that reproductive rates fluctuated biennially and were positively related to the amount of edge between late-seral and mid-seral forests and other habitat classes in the central Oregon Coast Range. Olson *et al*. (2004, pp. 1049-1050) concluded that their results indicate that while mid-seral and late-seral forests are important to spotted owls, a mixture of these forest types with younger forest and non-forest may be best for spotted owl survival and reproduction in their study area. In a large-scale demography modeling study, Forsman *et al*. (2011, pp. 1-2) found a positive correlation between the amount of suitable habitat and recruitment of young.

Reproductive Biology

The spotted owl is relatively long-lived, has a long reproductive life span, invests significantly in parental care, and exhibits high adult survivorship relative to other North American owls (Forsman *et al*. 1984; Gutiérrez *et al*. 1995, p. 5). Spotted owls are sexually mature at 1 year of age, but rarely breed until they are 2 to 5 years of age (Miller *et al*. 1985, p. 93; Franklin 1992, p. 821; Forsman *et al*. 2002, p. 17). Breeding females lay one to four eggs per clutch, with the average clutch size being two eggs; however, most spotted owl pairs do not nest every year, nor are nesting pairs successful every year (USFWS 1990b; Forsman *et al*. 1984, pp. 32-34; Anthony *et al*. 2006, p. 28), and renesting after a failed nesting attempt is rare (Gutiérrez 1996, p. 4). The small clutch size, temporal variability in nesting success, and delayed onset of breeding all contribute to the relatively low fecundity of this species (Gutiérrez 1996, p. 4).

Courtship behavior usually begins in February or March, and females typically lay eggs in late March or April. The timing of nesting and fledging varies with latitude and elevation (Forsman *et al*. 1984, p. 32). After they leave the nest in late May or June, juvenile spotted owls depend on their parents until they are able to fly and hunt on their own. Parental care continues after fledging into September (USFWS 1990a; Forsman *et al*. 1984, p. 38). During the first few weeks after the young leave the nest, the adults often roost with them during the day. By late summer, the adults are rarely found roosting with their young and usually only visit the juveniles to feed them at night (Forsman *et al*. 1984, p. 38). Telemetry and genetic studies indicate that close inbreeding between siblings or parents and their offspring is rare (Haig *et al*. 2001, p. 35; Forsman *et al*. 2002, p. 18). Hybridization of spotted owls with California spotted owls and barred owls has been confirmed through genetic research (Hamer *et al*. 1994, pp. 487-492; Gutiérrez *et al*. 1995, pp. 2-3; Dark *et al*. 1998, p. 52; Kelly 2001, pp. 33-35; Funk *et al*. 2008, pp. 161-171).

Dispersal Biology

Natal dispersal of spotted owls typically occurs in September and October with a few individuals dispersing in November and December (Miller *et al*. 1997; Forsman *et al*. 2002, p. 13). Natal dispersal occurs in stages, with juveniles settling in temporary home ranges between bouts of dispersal (Forsman *et al*. 2002, pp. 13-14; Miller *et al*. 1997, p. 143). The median natal dispersal distance is about 10 miles for males and 15.5 miles for females (Forsman *et al*. 2002, p. 16). Dispersing juvenile spotted owls experience high mortality rates, exceeding 70 percent in some studies (USFWS 1990a; Miller 1989, pp. 32-41). Known or suspected causes of mortality during dispersal include starvation, predation, and accidents (Miller 1989, pp. 41-44; USFWS 1990a; Forsman *et al*. 2002, pp. 18-19). Parasitic infection may contribute to these causes of mortality, but the relationship between parasite loads and survival is poorly understood (Hoberg *et al*. 1989, p. 247; Gutiérrez 1989, pp. 616-617; Forsman *et al*. 2002, pp. 18-19). Successful dispersal of juvenile spotted owls may depend on their ability to locate unoccupied suitable habitat in close proximity to other occupied sites (LaHaye *et al*. 2001, pp. 697-698).

There is little evidence that small openings in forest habitat influence the dispersal of spotted owls, but large, non-forested valleys such as the Willamette Valley apparently are barriers to both natal and breeding dispersal (Forsman *et al*. 2002, p. 22). The degree to which water bodies, such as the Columbia River and Puget Sound, function as barriers to dispersal is unclear, although radio telemetry data indicate that spotted owls move around large water bodies rather than cross them (Forsman *et al*. 2002, p. 22). Analysis of the genetic structure of spotted owl populations suggests that gene flow may have been adequate between the Olympic Mountains and the Washington Cascades, and between the Olympic Mountains and the Oregon Coast Range (Haig *et al*. 2001, p. 35).

Breeding dispersal occurs among a small proportion of adult spotted owls; these movements were more frequent among females and unmated individuals (Forsman *et al*. 2002, pp. 20-21). Breeding dispersal distances were shorter than natal dispersal distances and also are apparently random in direction (Forsman *et al*. 2002, pp. 21-22). In California spotted owls, a similar subspecies, the probability for dispersal was higher in younger owls, single owls, paired owls that lost mates, owls at low quality sites, and owls that failed to reproduce in the preceding year (Blakesley *et al*. 2006, p.77). Both males and females dispersed at near equal distances (Blakesley *et al*. 2006, p. 76). In 72 percent of observed cases of dispersal, dispersal resulted in increased habitat quality (Blakesley *et al*. 2006, p. 77).

Dispersal can also be described as having two phases: transience and colonization (Courtney *et al* 2004, p. 5-13). Fragmented forest landscapes are more likely to be used by owls in the transience phase as a means to move rapidly between denser forest areas (Courtney *et al* 2004, p. 5-13; USFWS 2012a, p. 14086). Movements through mature and old growth forests occur during the colonization phase when birds are looking to become established in an area (Miller *et al* 1997, p. 144; Courtney *et al* 2004, p. 5-13). Transient dispersers use a wider variety of forest conditions for movements than colonizing dispersers, who require habitats resembling nesting/roosting/foraging habitats used by breeding birds (USFWS 2012a, p. 14086). Dispersal success is likely highest in mature and old growth forest stands where there is more likely to be adequate cover and food supply (USFWS 2012a, p. 14086).

Food Habits

Spotted owls are mostly nocturnal, although they also forage opportunistically during the day (Forsman *et al*. 1984, p. 51; 2004, pp. 222-223; Sovern *et al*. 1994, p. 202). The composition of the spotted owl's diet varies geographically and by forest type. Generally, flying squirrels (*Glaucomys sabrinus*) are the most prominent prey for spotted owls in Douglas-fir and western hemlock forests (Forsman *et al*. 1984, pp. 40-41) in Washington and Oregon, while dusky-footed wood rats (*Neotoma fuscipes*) are a major part of the diet in the Oregon Klamath, California Klamath, and California Coastal provinces (Forsman *et al*. 1984, pp. 40-42; 2004, p. 218; Ward *et al*. 1998, p. 84; Hamer *et al*. 2001, p. 224). Depending on location, other important prey include deer mice (*Peromyscus maniculatus*), tree voles (*Arborimus longicaudus, A. pomo*), red-backed voles (*Clethrionomys* spp.), gophers (*Thomomys* spp.), snowshoe hare (*Lepus americanus*), bushy-tailed wood rats (*Neotoma cinerea*), birds, and insects, although these species comprise a small portion of the spotted owl diet (Forsman *et al*. 1984, pp. 40-43; 2004, p. 218; Ward *et al*. 1998; p. 84; Hamer *et al*. 2001, p.224).

Other prey species such as the red tree vole (*Arborimus longicaudus),* red-backed voles (*Clethrionomys gapperi),* mice, rabbits and hares, birds, and insects may be seasonally or locally important (reviewed by Courtney *et al*. 2004, pp. 4-27). For example, Rosenberg *et al*. (2003, p. 1720) showed a strong correlation between annual reproductive success of spotted owls (number of young per territory) and abundance of deer mice (*Peromyscus maniculatus*) (r2 = 0.68), despite the fact they only made up 1.6±0.5 percent of the biomass consumed. However, it is unclear if the causative factor behind this correlation was prey abundance or a synergistic response to weather (Rosenberg *et al*. 2003, p. 1723). Ward (1990, p. 55) also noted that mice were more abundant in areas selected for foraging by owls. Nonetheless, spotted owls deliver larger prey to the nest and eat smaller food items to reduce foraging energy costs; therefore, the importance of smaller prey items, like *Peromyscus*, in the spotted owl diet should not be underestimated (Forsman *et al*. 2001, p. 148; 2004, pp. 218-219). In the southern portion of their range, where woodrats are a major component of their diet, spotted owls are more likely to use a variety of stands, including younger stands, brushy openings in older stands, and edges between forest types in response to higher prey density in some of these areas (Forsman *et al*. 1984, pp. 24-29).

Population Dynamics

The spotted owl is relatively long-lived, has a long reproductive life span, invests significantly in parental care, and exhibits high adult survivorship relative to other North American owls (Forsman *et al*. 1984; Gutiérrez *et al*. 1995, p. 5). The spotted owl's long reproductive life span allows for some eventual recruitment of offspring, even if recruitment does not occur each year (Franklin *et al*. 2000, p. 576).

In coniferous forests, mean fledgling production of the California spotted owl (*Strix occidentalis occidentalis*), a closely related subspecies, was higher when minimum spring temperatures were higher (North *et al*. 2000, p. 805), a relationship that may be a function of increased prey availability. Across their range, spotted owls have previously shown an unexplained pattern of alternating years of high and low reproduction, with highest reproduction occurring during even-numbered years (*e.g.*, Franklin *et al*. 1999, p. 1). Annual variation in breeding may be related to weather (*i.e.*, temperature and precipitation) (Wagner *et al*. 1996, p. 74; Zabel *et al*. 1996, p.81 *In*: Forsman *et al*. 1996) and fluctuation in prey abundance (Zabel *et al*. 1996, pp.437-438).

A variety of factors may influence spotted owl population levels. These factors may be density-dependent (*e.g.*, habitat quality, habitat abundance) or density-independent (*e.g.*, climate). Interactions may occur among factors. For example, as habitat quality decreases, density-independent factors may have more influence on survival and reproduction, which tends to increase variation in the rate of growth (Franklin *et al*. 2000, pp. 581-582). Specifically, weather could have increased negative effects on spotted owl fitness for those owls occurring in relatively lower quality habitat (Franklin *et al*. 2000, pp. 581-582). A consequence of this pattern is that at some point, lower habitat quality may cause the population to be unregulated (have negative growth) and decline to extinction (Franklin *et al*. 2000, p. 583). Recent findings suggest that competition with barred owls is an important stressor of spotted owl populations, but habitat availability and climatic patterns also appear to influence survival, occupancy, recruitment, and, to a lesser extent, fecundity (Dugger *et al*, 2016, entire).

Olson *et al*. (2005, pp. 930-931) used open population modeling of site occupancy that incorporated imperfect and variable detectability of spotted owls and allowed modeling of temporal variation in site occupancy, extinction, and colonization probabilities (at the site scale). The authors found that visit detection probabilities average less than 0.70 and were highly variable among study years and among their three study areas in Oregon. Pair site occupancy probabilities declined greatly on one study area and slightly on the other two areas. However, for all owls, including singles and pairs, site occupancy was mostly stable through time. Barred owl presence had a negative effect on these parameters (see barred owl discussion in the New Threats section below). Recently the variable influences of different covariates for particular demographic parameters across study areas were noted by Dugger *et al*., 2016, entire. Authors noted that the control areas in Green Diamond Study Area (GDR-C), Washington Study Areas, and the Oregon Coast Study Area (COA) had the highest annual rates of population decline.

Threats

Reasons for Listing

The spotted owl was listed as threatened throughout its range "due to loss and adverse modification of suitable habitat as a result of timber harvesting and exacerbated by catastrophic events such as fire, volcanic eruption, and wind storms" (USFWS 1990a, p. 26114). More specifically, threats to the spotted owl included low populations, declining populations, limited habitat, declining habitat, inadequate distribution of habitat or populations, isolation of provinces, predation and competition, lack of coordinated conservation measures, and vulnerability to natural disturbance (USFWS 1992a, pp. 33-41). These threats were characterized for each province as severe, moderate, low, or unknown (USFWS 1992a, pp. 33-41). Declining habitat was recognized as a severe or moderate threat to the spotted owl throughout its range, isolation of populations was identified as a severe or moderate threat in 11 provinces, and a decline in population was a severe or moderate threat in 10 provinces. Together, these three factors represented the greatest concerns about range-wide conservation of the spotted owl. Limited habitat was considered a severe or moderate threat in nine provinces, and low populations were a severe or moderate concern in eight provinces, suggesting that these factors were also a concern throughout the majority of the spotted owl's range. Vulnerability to natural disturbances was rated as low in five provinces.

The degree to which predation and competition might pose a threat to the spotted owl was unknown in more provinces than any of the other threats, indicating a need for additional information. Few empirical studies exist to confirm that habitat fragmentation contributes to increased levels of predation on spotted owls (Courtney *et al*. 2004, pp. 11-8 to 11-9). However, great horned owls (*Bubo virginianus*), an effective predator on spotted owls, are closely associated with fragmented forests, openings, and clearcuts (Johnson 1992, p. 84; Laidig and Dobkin 1995, p. 155). As mature forests are harvested, great horned owls may colonize fragmented forests, thereby increasing spotted owl vulnerability to predation.

New Threats

The Service conducted a 5-year review of the spotted owl in 1994 (USFWS 2004), for which the Service prepared a scientific evaluation of the status of the spotted owl (Courtney *et al*. 2004). An analysis was conducted assessing how the threats described in 1990 might have changed by 2004. Some of the key threats identified in 2004 are:

- "Although we are certain that current harvest effects are reduced, and that past harvest is also probably having a reduced effect now as compared to 1990, we are still unable to fully evaluate the current levels of threat posed by harvest because of the potential for lag effects…In their questionnaire responses…6 of 8 panel members identified past habitat loss due to timber harvest as a current threat, but only 4 viewed current harvest as a present threat" (Courtney and Gutiérrez 2004, pp.11-7).
- "Currently the primary source of habitat loss is catastrophic wildfire, although the total amount of habitat affected by wildfires has been small (a total of 2.3 percent of the range-wide habitat base over a 10-year period)" (Courtney and Gutiérrez 2004, pp.11-8).
- "Although the panel had strong differences of opinion on the conclusiveness of some of the evidence suggesting [barred owl] displacement of [spotted owls], and the mechanisms by which this might be occurring, there was no disagreement that [barred owls] represented an operational threat. In the questionnaire, all 8 panel members identified [barred owls] as a current threat, and also expressed concern about future trends in [barred owl] populations" (Courtney and Gutiérrez 2004, pp. 11-8).

Threats, as identified in the 2011 Revised Recovery Plan for the Spotted owl, continue to emphasize that habitat loss and barred owls are the main threats to spotted owl recovery (USFWS 2011b, Appendix B).

Barred Owls (*Strix varia*)

Barred owls currently appear to be the primary threat to spotted owls. With its range expansion to as far south as Marin County, California (Gutiérrez *et al*. 2004, pp. 7-12 to 7-13; Steger *et al*. 2006, p.226), the barred owl's range now completely overlaps that of the spotted owl. Barred owls compete with spotted owls for prey (Hamer *et al*. 2001, p.226, Gutiérrez *et al*. 2007, p. 187; Livezey and Fleming 2007, p. 319, Wiens *et al*., 2014, pp. 24 and 33) or habitat (Hamer *et al*. 1989, p.55; Dunbar *et al*. 1991, p. 467; Herter and Hicks 2000, p. 285; Pearson and Livezey 2003, p. 274). In addition, barred owls have been documented to physically attack spotted owls (Pearson and Livezey 2003, p. 274), and circumstantial evidence strongly indicated that a barred owl killed a spotted owl (Leskiw and Gutiérrez 1998, p. 226). And finally, the growing body of evidence demonstrates that barred owls are causing significant negative demographic effects based on retrospective examination of long-term data collected on spotted owls (Kelly *et al*. 2003, p. 46; Pearson and Livezey 2003, p. 267; Olson *et al*. 2005, p. 921, Forsman *et al*., 2011, pp. 41-43, 69-70, Dugger *et al*., 2016, pp. 70-96).

Barred owls were initially thought to be more closely associated with early successional forests than spotted owls, based on studies conducted on the west slope of the Cascades in Washington (Hamer *et al* 1989, p. 34; Iverson 1993, p.39). However, recent studies conducted in the Pacific Northwest show that barred owls frequently use mature and old-growth forests (Pearson and Livezey 2003, p. 270; Gremel 2005, Schmidt 2006, p. 1; Singleton *et al*. 2010, pp. 290-292). In Western Oregon, Wiens *et al*. (2011, p. 537) found the overall occupancy probability of barred owls was high (.89) in an intensively managed forest landscape, representing an increase in barred owl occurrence in that region over the past 30 years (citing Taylor and Forsman 1976). In this Western Oregon study, barred owls were non-randomly distributed, with a highest proportion of public ownership containing a structurally diverse mixture of mature and old forests (p.537). In the fire prone forests of eastern Washington, a telemetry study conducted on barred owls showed that barred owl home ranges were located on lower slopes or valley bottoms, in closed canopy, mature, Douglas-fir forest, while spotted owl sites were located on mid-elevation areas with southern or western exposure, characterized by closed canopy, mature, ponderosa pine or Douglas-fir forest (Singleton *et al*. 2005, p. 1).

The two species of owls share similar habitats and are likely competing for food resources (Hamer *et al*. 2001, p. 226, Gutiérrez *et al*. 2007, p. 187; Livezey and Fleming 2007, p. 319, Wiens *et al*., 2014, pp. 24 and 33). Hamer found a strong diet overlap (76 percent) between northern spotted and barred owl diets (pp. 221, 226). Barred owl diets are more diverse than spotted owl diets and include species associated with riparian and other moist habitats (*e.g.*, fish, invertebrates, frogs, and crayfish), along with more terrestrial and diurnal species (Smith *et al*. 1983; Hamer *et al*. 2001; Gronau 2005, Wiens *et al*., 2014, p. 24). Even though barred owls appear to be generalists, spotted owls may be affected by a sufficient reduction in the density of these prey when they co-exist in an area, leading to a depletion of prey to the extent that the spotted owl cannot find an adequate amount of food to sustain maintenance or reproduction (Gutiérrez *et al*. 2007, p. 187; Livezey and Fleming 2007, p. 319).

There is scientific consensus on the negative influence barred owls are having on spotted owl detectability, site occupancy, reproduction, and survival The occupancy of historical territories by spotted owls in Washington and Oregon was found to be significantly lower ($p < 0.001$) after barred owls were detected within 0.8 kilometer (0.5 miles) of the territory center but was "only marginally lower" ($p = 0.06$) if barred owls were located more than 0.8 kilometer (0.5 miles) from the spotted owl territory center (Kelly *et al*. 2003, p. 51). Pearson and Livezey (2003, p. 271) found that there were significantly more barred owl site-centers in unoccupied spotted owl circles than occupied spotted owl circles (centered on historical spotted owl site-centers) with radii of 0.8 kilometer (0.5 miles) ($p = 0.001$), 1.6 kilometer (1 mile) ($p = 0.049$), and 2.9 kilometer (1.8 miles) ($p = 0.005$) in Gifford Pinchot National Forest. In Olympic National Park, Gremel (2005, p. 11) found a significant decline ($p = 0.01$) in spotted owl pair occupancy at sites where barred owls had been detected, while pair occupancy remained stable at spotted owl sites without barred owls. Olson *et al*. (2005, p. 928) found that the annual probability that a spotted owl territory would be occupied by a pair of spotted owls after barred owls were detected at the site declined by 5 percent in the HJ Andrews study area, 12 percent in the Coast Range study area, and 15 percent in the Tyee study area. In contrast, Bailey *et al*. (2009, p. 2983), when using a two-species occupancy model, showed no evidence that barred owls excluded spotted owls from territories in Oregon. Preliminary results from a barred owl and spotted owl radio-telemetry study in Washington reported two spotted owls fleeing their territories and traveling six and 15 miles, believed to be as a result of frequent direct encounters with barred owls (Irwin *et al*. 2010, pp. 3-4). Both spotted owls were subsequently found dead (Irwin and Rock. 2010, p. 4). Yackulic *et al*. (2014) modeled the occupancy dynamics of coexisting barred and spotted owls and found the competitive effects lead to a weaker relationship between habitat and spotted owl occupancy (Yackulic *et al*., 2014, pp. 271-273). Regarding territory occupancy dynamics, the most recent demographic meta-analysis found a consistent strong positive association between the territory extinction rates of spotted owls and the presence of barred owls and in all 11 study areas. Occupancy rates declined as follows (Dugger *et al*., 2016, p. 74):

- Washington - 56–100 percent in 1995 to 11–26 percent in 2013;
- Oregon - 61–88 percent in 1995 to 28–48 percent in 2013;
- California - 75–38 percent in NWC and from 79–47percent in HUP between 1995 and 2013
- In the control areas in the GDR study area, occupancy rates declined from 92 percent in 1999 to 55 percent in 2013.

Olson *et al*. (2004, p. 1048) found that the presence of barred owls had a significant negative effect on the reproduction of spotted owls in the central Coast Range of Oregon (in the Roseburg study area). The conclusion that barred owls had no significant effect on the reproduction of spotted owls in one study (Iverson 2004, p. 89) was unfounded because of small sample sizes (Livezey 2005, p. 102). It is likely that all of the above analyses underestimated the effects of barred owls on the reproduction of spotted owls because spotted owls often cannot be relocated after they are displaced by barred owls (E. Forsman, pers. comm., as cited in USFWS 2011b, p. B-11). Wiens *et al*. (2014, pp. 35-37) found barred owl demographic variables favoring barred owls. Survival and fecundity was higher in barred owls, with the barred owls producing on average 4.4 times the number of young. Dugger *et al*. 2016 found barred owls and habitat covariates explained small amounts of the year-to-year variation in fecundity (reproduction) in most study areas. Their models suggested fecundity was partially influenced by additive effects of regional and annual time variation, the amount of suitable core area habitat, barred owl presence, and the amount of edge habitat. There is substantial annual variation in fecundity among study areas, with support for declining trends in eight areas (CLE, COA, HJA, TYE, KLA, NWC, HUP, and GDR; (Dugger *et al*. 2016 p.91).

Barred owls are also influencing the survival, extinction, and colonization of spotted owls. Anthony *et al*. (2006, p. 32) found significant evidence for negative effects of barred owls on apparent survival of spotted owls in two of 14 study areas (Olympic and Wenatchee). They attributed the equivocal results for most of their study areas to the coarse nature of their barred owl covariate. Dugger *et al*. (2011, pp. 2463-2467) confirmed the synergistic effects of barred owls and territory habitat characteristics on extinction and colonization rates of territories by spotted owls in Oregon. Some spotted owl pairs retained their territories and continued to survive and successfully reproduce during their study even when barred owls were present, but the effects of reduced old growth forest in the core habitat areas were compounded when barred owls were present - extinction rates of spotted owl territories nearly tripled when barred owls were detected. Yackulic and others documented similar findings; the effects of interspecific competition were likely to negatively affect spotted owls, both through its immediate effects on local extinction and by indirectly lowering colonization (Yackulic *et al*., 2014, pp. 271-273).

Most recently, the key vital rates barred owls are most influencing in spotted owl populations appear to be apparent survival and local extinction rates (Dugger *et al*. 2016, p. 93-98). Additionally, these authors found a *positive* association between barred owl *removals* and spotted owl vital rates. Regional climate cycles were found to be strongly associated with apparent survival across all study areas. These recent results suggested that apparent annual survival rates were declining in eight of eleven study areas, and that declines were most strongly associated with increased detections of barred owls in seven areas. Because adult survival is a critical vital rate influencing the rate of population change in long-lived birds, the authors expressed concern that continued trends as found in this study could threaten the continued persistence of the subspecies.

Monitoring and management of spotted owls has become more complicated due to their possible reduced detectability when barred owls are present (Kelly *et al*. 2003, pp. 51-52; Courtney *et al*. 2004, p. 7-16 ; Olson *et al*. 2005, p. 929; Crozier *et al*. 2006, p.766-767). Olson *et al*. (2005, p. 924) found that the presence of barred owls had a significant negative effect on the detectability of spotted owls, and that the magnitude of this effect did not vary among years. In a study evaluating the response behavior and barred owl detection probabilities using spotted owl and barred owl (conspecific) calling, Wiens *et al*. (2011) found that response behavior and detection probabilities of barred owls varied between the types of surveys. These authors found that per-visit barred owl detection probabilities were higher for conspecific surveys. On average, response rates of barred owls were 10 percent lower and single visit detection probabilities were 18 percent lower during surveys for spotted owls compared to conspecific surveys, suggesting that barred owl occurrence is likely higher than what generally was recognized by spotted owl monitoring programs (pp.535-536). Evidence that spotted owls were responding less frequently during surveys led the Service and its many research partners to include updates to the spotted owl survey protocol, which were based on the probability of detecting spotted owls when barred owls are present (USFWS, 2011b).

Hybridization with barred owls may also negatively influence spotted owls, but the overall rangewide impact may not be significant. In an analysis of more than 9,000 banded spotted owls throughout their range, only 47 hybrids were detected (Kelly and Forsman 2004, p. 807). Consequently, hybridization with the barred owl is considered to be “an interesting biological phenomenon that is probably inconsequential, compared with the real threat—direct competition between the two species for food and space” (Kelly and Forsman 2004, p. 808).

As a result of compelling evidence suggesting that barred owls are exacerbating the spotted owl population decline, the Service initiated an experimental barred owl removal study beginning in 2013. The goal of this experiment is to test the feasibility of barred owl removal to determine whether it improves conditions for spotted owls on a small scale. If the experimental removal of barred owls results in improved spotted owl populations, wider scale treatments as part of a barred owl management strategy may be considered (USFWS 2013). In 2004, it was noted that there is no evidence that the increasing trend in barred owls has stabilized in any portion of the spotted owl's range in the western United States, and "there are no grounds for optimistic views suggesting that barred owl impacts on spotted owls have been already fully realized" (Gutiérrez *et al*. 2004, pp. 7-38). This situation to date does not appear to have changed. Without barred owl management continuing competition from barred owls may result in the extirpation of the spotted owl over large portions of its range, and the eventual extinction of the subspecies.

<u>Wildfire</u>

Fire is often considered a primary threat to spotted owls because of its potential to alter habitat rapidly (Bond *et al*. 2009, p. 1116) and is a major cause of habitat loss on Federal lands (Courtney *et al*. 2004, executive summary), particularly in the California Klamath Province (Davis *et al*., 2015, p. 17-22). At the time of listing there was recognition that large-scale wildfire posed a threat to the spotted owl and its habitat (USFWS 1990a, p. 26183). Information since suggests fire may be more of a threat than previously thought. The most recent Northwest Forest Plan Habitat Monitoring Report indicates that range-wide, the nesting/roosting habitat lost from fire (505,800 acres) represents about 31 percent of the total habitat loss. The rate of habitat loss in the relatively dry East Cascades and Klamath provinces is proportionally higher, comprising about 68 percent of nesting/roosting habitats on federal and non-federal lands lost from fire (Table 7, Davis *et al*., 2015). This is particularly concerning as most of these acres are located in reserved lands (Table 5, Davis *et al*., 2015).

It may be possible to influence through forest management how fire prone forests will burn and the extent of the fire when it occurs. Forest fuels are currently being managed throughout the spotted owl's range in an attempt to reduce the levels of fuels that have accumulated during nearly 100 years of effective fire suppression. However, our ability to protect spotted owl habitat and viable populations of spotted owls from large fires through risk-reduction endeavors is uncertain and debated in the literature (Courtney *et al*. 2004, pp. 12-11, Omi and Martenson 2002, pp. 19-27 Irwin *et al*., 2004, p. 21; Spies *et al* 2006p. 359-361; Hanson *et al*., 2009; pp.3-6; Spies *et al*., 2009, pp. 331-332; Ager *et al*., 2012, p.282; Odion *et al*., 2014 pp. 10-12; Spies *et al*., 2012, pp. 10-12; Odion 2014, pp. 46-49)). The Northwest Forest Plan (NWFP) recognized wildfire as an inherent part of managing spotted owl habitat in certain portions of the range. The distribution and size of reserve blocks as part of the NWFP design and the critical habitat network may help mitigate the risks associated with large-scale fire (Lint 2005, p. 77). Fire is a disturbance factor spotted owls have evolved with; however, studies indicate that the effects of wildfire on spotted owls and their habitat are variable, depending on site-specific fire intensity, severity, size, and the availability and distribution of suitable habitat (See review of literature in Appendix B). Within the fire-adapted forests of the spotted owl's range, spotted owls likely have adapted to withstand fires of variable sizes and severities, but these adaptations evolved under a different habitat baseline and different threats than those recognized currently. More research is needed to understand further the relationship between fire and spotted owl habitat use. Overall, we can conclude that fires are a change agent for spotted owl habitat, but there are still many unknowns regarding how much fire benefits or adversely affects spotted owl habitat (USFWS 2011b, p. III-31).

West Nile Virus

West Nile virus (WNV), caused by a virus in the family Flaviviridae, has killed millions of wild birds in North America since it arrived in 1999 (McLean *et al*. 2001; Caffrey 2003; Caffrey and Peterson 2003, pp. 7-8; Marra *et al*. 2004, p. 393). Mosquitoes are the primary carriers (vectors) of the virus that causes encephalitis in humans, horses, and birds. Mammalian prey may also play a role in spreading WNV among predators, like spotted owls. Owls and other predators of mice can contract the disease by eating infected prey (Garmendia *et al*. 2000, p. 3111; Komar *et al*. 2001). One captive spotted owl in Ontario, Canada, is known to have contracted WNV and died.

Health officials expect that WNV will eventually spread throughout the range of the spotted owl (Courtney *et al*. 2004; Blakesley *et al*. 2004, pp. 8-31), but it is unknown how WNV will ultimately affect spotted owl populations. Susceptibility to infection and the mortality rates of infected individuals vary among bird species (Blakesley *et al*. 2004, pp. 8-33), but most owls appear to be quite susceptible. For example, breeding Eastern screech owls (*Megascops asio*) in Ohio experienced 100 percent mortality (T. Grubb pers. comm., as cited in Blakesley *et al*. 2004, pp. 8-33). Barred owls, in contrast, showed lower susceptibility (B. Hunter pers. comm., as cited in Blakesley *et al*. 2004, pp. 8-34). Some level of innate resistance may occur (Fitzgerald *et al*. 2003), which could explain observations in several species of markedly lower mortality in the second year of exposure to WNV (Caffrey and Peterson 2003). Wild birds also develop resistance to WNV through immune responses (Deubel *et al*. 2001). The effects of WNV on bird populations at a regional scale have not been large, even for susceptible species (Caffrey and Peterson 2003), perhaps due to the short-term and patchy distribution of mortality (K. McGowan, pers. comm., as cited in Courtney *et al*. 2004) or annual changes in vector abundance and distribution.

Blakesley *et al*. (2004, pp. 8-35) offer competing propositions for the likely outcome of spotted owl populations being infected by WNV. One scenario is that spotted owls can tolerate severe, short-term population reductions due to WNV, because spotted owl populations are widely distributed and number in the several hundreds to thousands. An alternative scenario is that WNV will cause unsustainable mortality, due to the frequency and/or magnitude of infection, thereby resulting in long-term population declines and extirpation from parts of the spotted owl's current range. Thus far, no mortality in wild, spotted owls has been recorded; however, WNV is a potential threat of uncertain magnitude and effect (Blakesley *et al*. 2004, pp. 8-34).

Sudden Oak Death

Sudden oak death was recently identified as a potential threat to the spotted owl (Courtney *et al*. 2004). This disease is caused by the fungus-like pathogen, *Phytopthora ramorum* that was recently introduced from Europe and is rapidly spreading. The disease is now known to extend over 650 km from south of Big Sur, California to Curry County, Oregon (Rizzo and Garbelotto 2003, p. 198), and has reached epidemic proportions in oak (Quercus spp.) and tanoak

(*Lithocarpus densiflorus*) forests along approximately 300 kilometers of the central and northern California coast (Rizzo *et al*. 2002, p. 733). At the present time, sudden oak death is found in natural stands from Monterey to Humboldt Counties, California, and has reached epidemic proportions in oak (*Quercus* spp.) and tanoak (*Lithocarpus densiflorus*) forests along approximately 300 km of the central and northern California coast (Rizzo *et al*. 2002, p. 733). It has also been found near Brookings, Oregon, killing tanoak and causing dieback of closely associated wild rhododendron (*Rhododendron* spp.) and evergreen huckleberry (*Vaccinium ovatum*) (Goheen *et al*. 2002, p. 441). It has been found in several different forest types and at elevations from sea level to over 800 m. During a study completed between 2001 and 2003 in California, one-third to one-half of the hiker's present in the study area carried infected soil on their shoes (Davidson *et al*. 2005, p. 587), creating the potential for rapid spread of the disease. Sudden oak death poses a threat of uncertain proportion because of its potential impact on forest dynamics and alteration of key prey and spotted owl habitat components (*e.g.*, hardwood trees - canopy cover and nest tree mortality); especially in the southern portion of the spotted owl's range (Courtney *et al*. 2004, pp. 11-8).

Inbreeding Depression, Genetic Isolation, and Reduced Genetic Diversity

Inbreeding and other genetic problems due to small population sizes were not considered an imminent threat to the spotted owl at the time of listing. Recent studies show no indication of reduced genetic variation and past bottlenecks in Washington, Oregon, or California (Barrowclough *et al*. 1999, p. 922; Haig *et al*. 2004, p. 36). Canadian populations may be more adversely affected by issues related to small population size including inbreeding depression, genetic isolation, and reduced genetic diversity (Courtney *et al*. 2004, pp. 11-9). A 2004 study (Harestad *et al*. 2004, p. 13) indicates that the Canadian breeding population was estimated to be less than 33 pairs and annual population decline may be as high as 35 percent. In 2007, a recommendation was made by the Spotted Owl Population Enhancement Team to remove spotted owls from the wild in British Columbia (USFWS 2012a, p. 14078). This recommendation resulted in the eventual capture of the remaining 16 wild spotted owls in British Columbia for a captive breeding program (USFWS 2012a, p. 14078). Low and persistently declining populations throughout the northern portion of the species range (see "Population Trends" below) may be at increased risk of losing genetic diversity.

Hybridization of spotted owls with California spotted owls, Mexican spotted owls, and barred owls has been confirmed through genetic research (Funk *et al*. 2008, p. 1; Hamer *et al*. 1994, p. 487; Gutiérrez *et al*. 1995, p. 3; Dark *et al*. 1998, p. 50; Kelly 2001, pp. 33-35).

Climate Change

Climate change, combined with effects from past management practices is influencing current forest ecosystem processes and dynamics by increasing the frequency and magnitude of wildfires, insect outbreaks, drought, and disease (USFWS 2011b, pp. III-5 - III-11). In the Pacific Northwest, mean annual temperatures rose 0.8° C (1.5° F) in the 20th century and are expected to continue to warm from 0.1° to 0.6° C (0.2° to 1° F) per decade (Mote and Salathe 2010, p. 29). Climate change models generally predict warmer, wetter winters and hotter, drier summers and increased frequency of extreme weather events in the Pacific Northwest (Salathe *et al*. 2010, pp. 72-73).

Predicted climate changes in the Pacific Northwest have implications for forest disturbances that affect the quality and distribution of spotted owl habitat. Both the frequency and intensity of wildfires and insect outbreaks are expected to increase over the next century in the Pacific Northwest (Littell *et al*. 2010, p. 130). One of the largest projected effects on Pacific Northwest forests is likely to come from an increase in fire frequency, duration, and severity. Westerling *et al*. (2006, pp. 940-941) analyzed wildfires and found that since the mid-1980s, wildfire frequency in western forests has nearly quadrupled compared to the average of the period from 1970-1986. The total area burned is more than 6.5 times the previous level and the average length of the fire season during 1987-2003 was 78 days longer compared to 1978-1986 (Westerling *et al*. 2006, p. 941). The area burned annually by wildfires in the Pacific Northwest is expected to double or triple by the 2080s (Littell *et al*. 2010, p. 140). Wildfires are now the primary cause of spotted owl habitat loss on Federal lands, with over 236,000 acres of habitat loss attributed to wildfires from 1994 to 2007 (Davis *et al*. 2011, p. 123).

Potential changes in temperature and precipitation could have important implications for spotted owl reproduction and survival. Wet, cold weather during the winter or nesting season, particularly the early nesting season, has been shown to negatively affect spotted owl reproduction (Olson *et al*. 2004, p. 1039, Dugger *et al*. 2005, p. 863), survival (Franklin *et al*. 2000 pp. 576-577, Olson *et al*. 2004, p. 1039, Glenn *et al*. 2011b, p. 1279), and recruitment (Glenn *et al*. 2010, pp.2446-2547). Cold, wet weather may reduce reproduction and/or survival during the breeding season due to declines or decreased activity in small mammal populations so that less food is available during reproduction when metabolic demands are high (Glenn *et al*. 2011b, pp. 1288-1289). Cold, wet nesting seasons may increase the mortality of nestlings due to chilling and reduce the number of young fledged per pair per year (Franklin *et al*. 2000, p.557, Glenn *et al*. 2011b, p. 1286). Most recently, the relationships between spotted owl populations and climate was complex and variable, but rangewide, Dugger *et al*. (2016) suggested that survival of young spotted owls and their ability to become part of the breeding population increased when winters were drier. This may become a factor in population numbers in the future given climate change predictions for the Pacific Northwest include warmer, wetter winters.

Drought or hot temperatures during the summer have also been linked to reduced spotted owl recruitment (Glenn *et al*. 2010, p. 2549). Drier, warmer summers and drought conditions during the growing season strongly influence primary production in forests, food availability, and the population sizes of small mammals that spotted owls prey upon (Glenn *et al*. 2010, p. 2549).

In summary, climate change is likely to exacerbate some existing threats to the spotted owl such as the projected potential for increased habitat loss from drought-related fire, tree mortality, insects and disease, as well as affecting reproduction and survival during years of extreme weather. We provide a general overview of climate change effects in Appendix D.

<u>Disturbance</u>

Spotted owls may also respond physiologically to a disturbance without exhibiting a significant behavioral response. In response to environmental stressors, vertebrates secrete stress hormones called corticosteroids (Campbell 1990, p. 925). Although these hormones are essential for survival, extended periods with elevated stress hormone levels may have negative effects on reproductive function, disease resistance, or physical condition (Carsia and Harvey 2000, pp. 517-518; Saplosky *et al*. 2000, p. 1). In avian species, the secretion of corticosterone is the primary non-specific stress response (Carsia and Harvey 2000, p. 517). The quantity of this hormone in feces can be used as a measure of physiological stress (Wasser *et al*. 1997, p. 1019). Recent studies of fecal corticosterone levels of spotted owls indicate that low intensity noise of short duration and minimal repetition does not elicit a physiological stress response (Tempel and Gutiérrez 2003, p. 698; Tempel and Gutiérrez 2004, p. 538). However, prolonged activities, such as those associated with timber harvest, may increase fecal corticosterone levels depending on their proximity to spotted owl core areas (Wasser *et al*. 1997, p.1021; Tempel and Gutiérrez 2004, p. 544).

The effects of noise on spotted owls are largely unknown, and whether noise is a concern has been a controversial issue. The effect of noise on birds is extremely difficult to determine due to the inability of most studies to quantify one or more of the following variables: 1) timing of the disturbance in relation to nesting chronology; 2) type, frequency, and proximity of human disturbance; 3) clutch size; 4) health of individual birds; 5) food supply; and 6) outcome of previous interactions between birds and humans (Knight and Skagan 1998, pp. 355-358). Additional factors that confound the issue of disturbance include the individual bird's tolerance level, ambient sound levels, physical parameters of sound, and how it reacts with topographic characteristics and vegetation, and differences in how species perceive noise.

Information specific to behavioral responses of spotted owls to disturbance is limited, research indicates that recreational activity can cause Mexican spotted owls (*S. o. lucida*) to vacate otherwise suitable habitat (Swarthout and Steidl 2001, p. 314) and helicopter overflights can reduce prey delivery rates to nests (Delaney *et al*. 1999, p. 70). Additional effects from disturbance, including altered foraging behavior and decreases in nest attendance and reproductive success, have been reported for other raptors (White and Thurow 1985, p. 14; Andersen *et al*. 1989, p. 296; McGarigal *et al*. 1991, p. 5).

Although it has not been conclusively demonstrated, it is anticipated that nesting spotted owls may be disturbed by heat and smoke as a result of burning activities during the breeding season.

Conservation Needs of the Spotted Owl

Based on the above assessment of threats, the spotted owl has the following habitat-specific and habitat-independent conservation (*i.e.*, survival and recovery) needs:

Habitat-specific Needs

1. Large blocks of habitat capable of supporting clusters or local population centers of spotted owls (*e.g.*, 15 to 20 breeding pairs) throughout the owl's range;

2. Suitable habitat conditions and spacing between local spotted owl populations throughout its range that facilitate survival and movement;

3. Suitable habitat distributed across a variety of ecological conditions within the northern spotted owl's range to reduce risk of local or widespread extirpation;

4. A coordinated, adaptive management effort to reduce the loss of habitat due to catastrophic wildfire throughout the spotted owl's range, and a monitoring program to clarify whether these risk reduction methods are effective and to determine how owls use habitat treated to reduce fuels; and

5. In areas of significant population decline, sustain the full range of survival and recovery options for this species in light of significant uncertainty.

Habitat-independent Needs

1. A coordinated research and adaptive management effort to better understand and manage competitive interactions between spotted and barred owls; and

2. Monitoring to understand better the risk that WNV and sudden oak death pose to spotted owls and, for WNV, research into methods that may reduce the likelihood or severity of outbreaks in spotted owl populations.

Conservation Strategy

Since 1990, various efforts have addressed the conservation needs of the spotted owl and attempted to formulate wide-ranging strategies based upon these needs. These efforts began with the ISC's Conservation Strategy (Thomas *et al*. 1990); they continued with the designation of critical habitat (USFWS 1992a), the Draft Recovery Plan (USFWS 1992b), and the Scientific Analysis Team report (Thomas *et al*. 1993), report of the Forest Ecosystem Management Assessment Team (Thomas and Raphael 1993); the NWFP (USFS and BLM 1994a), and they culminated with the Revised Recovery Plan (USFWS 2011b) and the revised final critical habitat designation (USFWS 2012a). Each of these strategies was based upon the reserve design principles first articulated in the ISC's report, which are summarized as follows:

- Species that are well distributed across their range are less prone to extinction than species confined to small portions of their range.
- Large blocks of habitat, containing multiple pairs of the species, are superior to small blocks of habitat with only one to a few pairs.
- Blocks of habitat that are close together are better than blocks far apart.
- High quality habitat that occurs in contiguous blocks is better than habitat that is more fragmented.
- Habitat between blocks is more effective as dispersal habitat if it resembles suitable habitat.

Federal Contribution to Recovery

Since it was signed on April 13, 1994, the NWFP has guided the management of Federal forest lands within the range of the spotted owl (USFS and BLM 1994a, 1994b; USFWS 1994b). The NWFP was designed to protect large blocks of old growth forest and provide habitat for species that depend on those forests including the spotted owl. Land management under the NWFP was expected to provide for the long term conservation of the spotted owl by including land use allocations which would sustain population clusters of spotted owls (*i.e.*, demographic support) and maintain connectivity between populations. Certain land use allocations in the plan contribute to supporting population clusters: LSRs, Managed Late-successional Areas, and Congressionally Reserved areas. Riparian Reserves, Adaptive Management Areas, and Administratively Withdrawn areas can provide both demographic support and connectivity/dispersal between the larger blocks, but were not necessarily designed for that purpose. To ensure a predictable and sustainable level of timber sales, "matrix" areas were designated to support timber production while also retaining some connectivity and biological legacy components important to old-growth obligate species (in 100-acre owl cores, 15 percent late-successional provision, etc. (USFS and BLM 1994a, USFWS 1994b) which would persist into future managed timber stands.

One of the overall goals of the NWFP was to protect and enhance habitat for the spotted owl on federal lands. The NWFP predicted that over time, the rate of habitat losses would be reduced and the spotted owl population would decline in the Matrix land use allocation, while the population would stabilize and eventually increase within LSRs as habitat conditions improved over the next 50 to 100 years (Thomas and Raphael 1993, p. II-31; USFS and BLM 1994a, 1994b, p.3&4-229).

Periodic assessments monitoring changes in spotted owl habitat on federal and non-federal lands within its geographic range in the United States have been published every five years since 2005 (Lint 2005, Davis *et al*., 2011; Forsman *et al*., 2011, Davis *et al*., 2015). These assessments evaluate assumptions made during development of the NWFP; including the assumption that habitat would not decline faster than five percent per decade. Key points of the 2015 NWFP Monitoring Report (Davis *et al*., 2015, pp. 20, 36-39):

- Reductions in habitat rangewide have not exceeded expectations. During its first two decades, rangewide losses of nesting/roosting habitat on federal lands were estimated at total rangewide loss of 7.2 percent (5.2 percent (474,300 ac) from wildfire, 1.3 percent (116,100 ac) from timber harvesting, and 0.7 percent (59,800 ac) from insects, disease, or other natural disturbances)
- Rangewide there has been a gross loss of about 650,200 ac of nesting/roosting habitat on federal lands or about 7.2 percent of what was present right before the NWFP was established.
- Most of the losses (73 percent) occurred within the federally reserved land use allocations, or a loss of about 7.5 percent of the habitat reserved by the NWFP.
- Non-reserved federal land use allocations experienced a 6.4 percent rangewide loss of habitat that existed in 1993.
- Wildfires were the primary cause of habitat loss since 1993, accounting for about 82 percent of the loss in reserved allocations and about half of the loss in non-reserved allocations

- Some areas are affected by nesting/roosting habitat loss disproportionally particularly within the Oregon and California Klamath provinces - 56 percent of the rangewide habitat loss on federal lands occurred in these two provinces
- Oregon and California Klamath physiographic provinces experienced the largest amounts (132,000 to 199,800 ac respectively) and double digit percentage losses (13.2 and 10.7 percent respectively) since the plan was implemented.
- Some habitat growth/recruitment is occurring in portions of the range and appears to have begun to help offset losses
- These authors project that if localized habitat losses continue at the current rates within some provinces in the reserved land allocations, the effectiveness of the Plan to maintain the distributed and connected spotted owl populations across the range is in question (Davis *et al*., 2011, p. 54).

Similar to the periodic assessments monitoring changes in spotted owl habitat on Federal and non-federal lands, population trends are also monitored on eleven study sites in Washington, Oregon, and California. The most recent meta-analysis has determined a mean annual decline of 3.8 percent decline rangewide (Dugger *et al*., 2016), an increase from the 2.8 percent decline reported in 2011. With the influence of the barred owl it is unlikely that the NWFP assumptions regarding the stabilizing of the spotted owl populations over time would be met. Refer to Population Dynamics and Barred Owl sections above for more information pertaining to recent findings.

On June 28, 2011 the Service published the Revised Recovery Plan for the Spotted owl (USFWS 2011b). The recovery plan identifies threats from competition with barred owls, ongoing loss of spotted owl habitat as a result of timber harvest, loss or modification of spotted owl habitat from uncharacteristic wildfire, and loss of amount and distribution of spotted owl habitat as a result of past activities and disturbances (USFWS 2011b, p. II-2 and Appendix B). To address these threats, the current recovery strategy identifies five main steps: 1) development of a range-wide habitat modeling framework; 2) barred owl management; 3) monitoring and research; 4) adaptive management; and 5) habitat conservation and active forest restoration (USFWS 2011b, p. II-2). The recovery plan lists recovery actions that address each of these items, some of which were retained from the 2008 recovery plan. The Managed Owl Conservation Areas and Conservation Support Areas recommended in the 2008 recovery plan are not a part of the recovery strategy outlined in the revised recovery plan. The Service completed a range-wide, multi-step habitat modeling process to help evaluate and inform management decisions and critical habitat development (USFWS 2011b, Appendix C).

The revised recovery plan (USFWS 2011b) recommended implementing a robust monitoring and research program for the spotted owl. The recovery plan encourages these efforts by laying out the following primary elements to evaluate progress toward meeting recovery criteria: monitoring spotted owl population trends, comprehensive barred owl research and monitoring, continued habitat monitoring; inventory of spotted owl distribution, and; explicit consideration for climate change mitigation goals consistent with recovery actions (USFWS 2011b, p. II-5). The revised recovery plan also strongly encourages land managers to be aggressive in the implementation of recovery actions. In other words, land managers should not be so conservative that, to avoid risk, they forego actions that are necessary to conserve the forest ecosystems that are necessary to the long-term conservation of the spotted owl. But they should also not be so aggressive that they subject spotted owls and their habitat to treatments where the long-term benefits do not clearly outweigh the short-term risks. Finding the appropriate balance to this dichotomy will remain an ongoing challenge for all who are engaged in spotted owl conservation (USFWS 2011b, p. II-12).

Conservation Efforts on Non-Federal Lands

In the report from the Interagency Scientific Committee (Thomas *et al*. 1990, p. 3, p. 272), the draft recovery plan (USFWS 1992b), and the report from the Forest Ecosystem Management Assessment Team (Thomas and Raphael 1993, p. IV-189), it was noted that limited Federal ownership in some areas constrained the ability to form a network of old-forest reserves to meet the conservation needs of the spotted owl. In these areas in particular, non-Federal lands would be important to the range-wide goal of achieving conservation and recovery of the spotted owl. The Service's primary expectations for private lands are for their contributions to demographic support (pair or cluster protection) to Federal lands, or their connectivity with Federal lands. In addition, timber harvest within each state is governed by rules that provide protection of spotted owls or their habitat to varying degrees.

There are 17 current and ongoing conservation plans (CPs) including Habitat Conservation Plans (HCPs) and Safe Harbor Agreements (SHAs) that have incidental take permits issued for spotted owls. Eight of these are located in Washington, three in Oregon, and six in California (USFWS 2011b, p. A-15). The CPs range in size from 76 acres to more than 1.8 million acres, although not all acres are included in the mitigation for spotted owls. In total, the CPs cover approximately 3 million acres (9.4 percent) of the 32 million acres of non-Federal forest lands in the range of the spotted owl. The period of time that the HCPs will be in place ranges from 20 to 100 years. Although each CP is unique, there are several general approaches to mitigation of incidental take:

- Reserves of various sizes, some associated with adjacent Federal reserves
- Forest harvest that maintains or develops nesting habitat
- Forest harvest that maintains or develops foraging habitat
- Forest management that maintains or develops dispersal habitat
- Deferral of harvest near specific sites

Washington. In 1996, the State Forest Practices Board adopted rules (Washington Forest Practices Board 1996) that would contribute to conserving the spotted owl and its habitat on non-Federal lands. Adoption of the rules was based in part on recommendations from a Science Advisory Group that identified important non-Federal lands and recommended roles for those lands in spotted owl conservation (Hanson *et al*. 1993, pp. 11-15; Buchanan *et al*. 1994, p. ii). The 1996 rule package was developed by a stakeholder policy group and then reviewed and approved by the Forest Practices Board (Buchanan and Swedeen 2005, p. 9). Spotted owl-related HCPs in Washington generally were intended to provide demographic or connectivity support (USFWS 1992b, p. 272). There are over 2.1 million acres of land in six HCPs and two SHAs (USFWS 2011b, p. A-15). Some of these CPs focus on providing nesting/roosting habitat throughout the area or in strategic locations, while others focus on providing connectivity through foraging habitat and/or dispersal habitat. In addition, there is a long term habitat management agreement covering 13,000 acres in which authorization of take was provided through an incidental take statement (section 7) associated with a Federal land exchange (USFWS 2011b, p. A-15).

Oregon. The Oregon Forest Practices Act provides for protection of 70-acre core areas around sites occupied by an adult pair of spotted owls capable of breeding (as determined by recent protocol surveys), but it does not provide for protection of spotted owl habitat beyond these areas (ODF 2007, p. 64). In general, no large-scale spotted owl habitat protection strategy or mechanism currently exists for non-Federal lands in Oregon. The three spotted owl-related HCPs currently in effect cover more than 300,000 acres of non-Federal lands. These HCPs are intended to provide some nesting habitat and connectivity over the next few decades (USFWS 2011b, p. A-16). On July 27, 2010, the Service completed a programmatic SHA with the Oregon Department of Forestry that will enroll up to 50,000 acres of non-federal lands within the State over 50 years. The primary intent of this programmatic SHA is to increase time between harvests and to lightly to moderately thin younger forest stands that are currently not habitat to increase tree diameter and stand diversity (USFWS 2011b, p. A-16).

California. The California State Forest Practice Rules, which govern timber harvest on private lands, require surveys for spotted owls in suitable habitat and to provide protection around activity centers (California Department of Forestry and Fire Protection 2007, pp. 85-87). Under the Forest Practice Rules, no timber harvest plan can be approved if it is likely to result in incidental take of federally listed species, unless the take is authorized by a Federal incidental take permit (California Department of Forestry and Fire Protection 2007, pp. 85-87). Currently CALFIRE reviews all timber harvest plans to ensure that take was is not likely to occur. Two industrial timberland owners operate under spotted owl management plans that have been reviewed by the Service and that specify basic measures for spotted owl protection. Four HCPs and two SHAs authorizing take of spotted owls have been approved; these HCPs cover more than 622,000 acres of non-Federal lands. Implementation of these plans is intended to provide for spotted owl demographic and connectivity support to NWFP lands (USFWS 2011b, p. A-16).

Current Condition of the Spotted Owl

The current condition of the species incorporates the effects of all past human activities and natural events that led to the present-day status of the species and its habitat (USFWS and USDC NMFS 1998, pp. 4-19).

Range-wide Habitat and Population Trends

Range-wide Habitat Baseline

The Service has used information provided by the USFS, BLM, and National Park Service to update the habitat baseline conditions by tracking relative habitat changes over time on Federal lands for spotted owls on several occasions, since the spotted owl was listed in 1990 (USFS and BLM 1994b, USDI 2001, Lint 2005, Davis *et al*. 2011). The estimate of 7.4 million acres used for the NWFP in 1994 (USDA and USDI 1994b) was believed to be representative of the general amount of spotted owl habitat on NWFP lands at that time.

Periodic range-wide evaluations of habitat, as compared to the Final Supplemental Environmental Impact Statement (FSEIS; USFS and BLM 1994b), are necessary to determine if the rate of potential change to spotted owl habitat is consistent with the change anticipated in the NWFP: a reduction in suitable habitat of approximately 2.5 percent per decade (USFS and BLM 1994a, p. 46). The most recent mapping effort estimates a range-wide gross loss of about 650,200 ac of nesting/roosting habitat on federal lands, amounting to about 7.2 percent of what was present in 1993 (Davis et al. 2016, p. 23). Most of the losses (73 percent) occurred within the federally reserved land use allocations, or a loss of about 7.5 percent of the habitat reserved by the NWFP. The primary cause of habitat loss since 1993 was wildfires, accounting for about 82 percent of the rangewide loss in reserved allocations (388,500 acres) and about half of the loss in non-reserved allocations (85,900 ac) (Davis et al. 2016, p. 23).

Although the spatial resolution of this new habitat map currently makes it unsuitable for tracking habitat effects at the scale of individual projects, it is informative for tracking provincial and range-wide habitat trends and the Service now considers these data as the best available information on the distribution and abundance of extant spotted owl habitat within its range as of 2006 for Oregon and Washington, and 2007 for California (when the base imagery was collected).

April 13, 2004, marked the start of the second decade of the NWFP. Decade-specific baselines and summaries of effects by State, physiographic province and land use function from proposed management activities and natural events are not provided here, but are consistent with expected habitat changes under the NWFP. In February 2013, the Service adopted the 2006/2007 satellite imagery data on spotted owl habitat as the best available data reflecting the range-wide habitat baseline for Federal lands. On that basis, the assessment of local, provincial and range-wide spotted owl habitat status in this and future Opinions as well as Biological Assessments will rely on these 2006/07 habitat data to characterize changes in the status of spotted owl habitat.

<u>Service's Consultation Database</u>

In general, the analytical framework of these section 7 consultations focuses on the reserve and connectivity goals established by the NWFP land-use allocations (USFS and BLM 1994a), with effects expressed in terms of changes in suitable spotted owl habitat within those land-use allocations. To update information considered in 2001 (USDI 2001), the Service designed the Consultation Effects Tracking System database in 2002, which recorded impacts to spotted owls and their habitat at different spatial and temporal scales. In 2011, the Service replaced the Consultation Effects Tracking System with the Consulted on Effects Database located in the Service's Environmental Conservation Online System (ECOS). The ECOS Database corrected technical issues with the Consultation Effects Tracking System. Data are currently entered into the ECOS Database under various categories including; land management agency, land-use allocation, physiographic province, and type of habitat affected.

<u>Range-wide Consultation Effects: 1994 to present</u>

The Service updated the ECOS Database to reflect the 2006/2007 habitat baseline developed for the NWFP 15-year monitoring report (Davis *et al*. 2011, Appendix D, Table D) but at the time of this writing, this had not been updated to reflect the data within the 2015 NWFP 20-year report. the ECOS database reports that on NWFP lands between 1994 and December 29, 2016, the Service has consulted on the proposed removal/downgrade of approximately 212,374 acres (Table 25) or about 2.4 percent of the 8.854 million acres of spotted owl nesting/roosting habitat, estimated by Davis *et al*. (2011) and displayed in Table 26, to have occurred on Federal lands. These changes in suitable spotted owl habitat are consistent with the expectations for implementation of the NWFP, which anticipated a rate of habitat harvested at 2.5 percent per decade (USFS and BLM 1994a).

Table 25. Range-wide aggregate of changes to NRF[1] habitat acres from activities subject to section 7 consultations and from other causes. Data covers from 1994 to December 29, 2016.

Land Ownership	Consulted On Habitat Changes[2]		Other Habitat Changes[3]	
	Removed/ Downgraded	Maintained/ Improved	Removed/ Downgraded	Maintained/ Improved
NWFP (FS,BLM,NPS)	212,374	563,798	275,958	97,136
Bureau of Indian Affairs / Tribes	114,099	28,372	2,398	0
Habitat Conservation Plans/Safe Harbor Agreements	339,692	14,539	N/A	N/A
Other Federal, State, County, Private Lands	68,813	28,447	2,392	0
Total Changes	734,978	635,156	280,748	97,136

Notes:

1. Nesting, roosting, foraging (NRF) habitat. In California, suitable habitat is divided into two components; nesting - roosting (NR) habitat, and foraging (F) habitat. The NR component most closely resembles NRF habitat in Oregon and Washington. Due to differences in reporting methods, effects to suitable habitat compiled in this, and all subsequent tables include effects for nesting, roosting, and foraging (NRF) for 1994-6/26/2001. After 6/26/2001 suitable habitat includes NRF for Washington and Oregon but only nesting and roosting (NR) for California.
2. Includes both effects reported in USFWS 2001 and subsequent effects reported in the Spotted owl Consultation Effects Tracking System (web application and database.)
3. Includes effects to suitable NRF habitat (as generally documented through technical assistance, etc.) resulting from wildfires (not from suppression efforts), insect and disease outbreaks, and other natural causes, private timber harvest, and land exchanges not associated with consultation.

The Service also tracks habitat changes on non-NWFP lands through consultations for long-term Habitat Conservation Plans, Safe Harbor Agreements, Tribal Forest Management Plans, and other state, private, or county actions containing a federal nexus. Service consultations conducted on these lands outside of the NWFP since 1994 have documented the eventual removal of over 522,604 acres habitat (about 4 percent of the 1993 all lands rangewide nesting/roosting habitat estimate of 12.525 million acres (Davis *et al*. 2016, page 22)) on non-NWFP lands. Most of these losses have yet to be realized because they are part of large-scale, long-term Habitat Conservation Plans.

Range-wide Consultation Effects: 2006/2007 to present

Because the data developed for the NWFP monitoring program is only current through 2006/2007, the Service continues to rely on information compiled in the spotted owl consultation database to summarize effects to current owl habitat at provincial and range-wide scales (Table 26).

Table 26. Summary of spotted owl suitable habitat (NRF[1]) acres removed or downgraded as documented through Section 7 consultations on all Federal Lands within the Northwest Forest Plan area. Environmental baseline and summary of effects by State, Physiographic Province, and Land Use Function from 2006 to December 29, 2016.

State	Physiographic Province[2]	Evaluation Baseline (2006/2007)[3]			Habitat Removed/Downgraded[4]							% Provincial Baseline Affected	% Range-wide Effects
					Land Management Effects			Habitat Loss from Natural Events			Total NRF removed/ downgraded		
		Nesting/ Roosting Acres in Reserves	Nesting/ Roosting Acres in Non-Reserves	Total Nesting Roosting Acres	Reserves[5]	Non-Reserves	Total	Reserves	Non-Reserves	Total			
WA	Eastern Cascades	462,400	181,100	643,500	2,700	2,240	4,940	5,454	132	5,586	10,526	1.64	5.13
	Olympic Peninsula	729,000	33,400	762,400	6	0	6	0	1	1	7	0	0.01
	Western Cascades	1,031,600	246,600	1,278,200	779	877	1,656	3	0	3	1,659	0.13	1.29
	Western Lowlands	24,300	0	24,300	0	0	0	0	0	0	0	0	0
OR	Cascades East	248,500	128,400	376,900	2,994	7,865	10,859	7,639	2,434	10,073	20,932	5.55	15.93
	Cascades West	1,275,200	939,600	2,214,800	1,594	26,838	28,432	761	1,775	2,536	30,968	1.4	23.49
	Coast Range	494,400	113,400	607,800	750	1,891	2,641	0	0	0	2,641	0.43	2.05
	Klamath Mountains	549,400	334,900	884,300	3,017	7,426	10,443	5,736	3,840	9,576	20,019	2.26	14.99
	Willamette Valley	700	2,600	3,300	0	0	0	0	0	0	0	0	0
CA	Cascades	101,700	102,900	204,600	10	68	78	325	0	325	403	0.2	0.26
	Coast	132,900	10,100	143,000	274	1	275	0	2,193	2,193	2,468	1.73	0.35
	Klamath	910,900	501,200	1,412,100	317	1,064	1,381	24,420	27,974	52,394	53,775	3.81	36.51
Total		**5,961,000**	**2,594,200**	**8,555,200**	**12,441**	**48,270**	**60,711**	**44,338**	**38,349**	**82,687**	**143,398**	**1.68**	**100**

1. **Notes:** Nesting, roosting, foraging (NRF) habitat. In WA/OR, the values for Nesting/Roosting habitat generally represent the distribution of suitable owl habitat, including foraging habitat. In CA, foraging habitat occurs in a much broader range of forest types than what is represented by nesting/roosting habitat. Baseline information for foraging habitat as a separate category in CA is currently not available at a provincial scale.
2. Defined in the Revised Recovery Plan for the Spotted owl (USFWS 2011) as Recovery Units as depicted on p. A-3.
3. Spotted owl nesting and roosting habitat on all Federal lands (includes USFS, BLM, NPS, DoD, USFWS, etc.) as reported by Davis *et al*. 2011 for the Northwest Forest Plan 15-Year Monitoring Report (PNW-GTR-80, Appendix D). NR habitat acres are approximate values based on 2006 (OR/WA) and 2007 (CA) satellite imagery and have not yet been updated to incorporate the 20-Year monitoring report.
4. Estimated NRF habitat removed or downgraded from land management (timber sales) or natural events (wildfires) as documented through section 7 consultation or technical assistance. Effects reported here include all acres removed or downgraded from 2006 to present. Effects in California reported here only include effects to Nesting/Roosting habitat. Foraging habitat removed or downgraded in California is not summarized in this table.
5. Reserve land use allocations under the NWFP intended to provide demographic support for spotted owls include LSR, MLSA, and CRA. Non-reserve allocations under the NWFP intended to provide dispersal connectivity between reserves include AWA, AMA, and MX.

Table 26 summarizes the habitat impacts on Federal lands that have occurred since 2006/2007 through December 29, 2016. Note these data reflect data provided through the section 7 consultation efforts and may not reflect the same data displayed in Davis *et al*., 2015. This database reports an estimated 143,398 acres of nesting, roosting, and foraging habitat has been removed or downgraded from Federal lands since 2006/2007 due to land management activities and natural events. When overall habitat loss is evaluated as a proportion of provincial baselines, the Oregon Cascades East, Oregon Klamath Mountains, California Coast and the California Klamath provinces have proportional losses greater than the loss of habitat across all provinces. Although variable among the individual provinces, the majority of the impacts are caused from natural events (about 82,687 of the 143,398 acres total removed or downgraded), the majority of which also has occurred in the California and Oregon Klamath and Oregon Cascades East Provinces. When management-related habitat loss is evaluated as a proportion of the affected acres, Oregon reports the highest proportion, with about 74,560 acres removed. Washington reports about 12,192 acres, and California about 56,646 acres removed. Losses in California Klamath from natural disturbance, primarily wildland fires, represents about 63 percent of the habitat lost from these causes rangewide (about 52,394 of the 82,687 lost from disturbance). These losses in the California Klamath specifically represents about 37 percent of the total habitat lost rangewide (53,775 of 143,398 acres).

Table 27. Summary of spotted owl suitable habitat (NRF)[1] acres removed or downgraded on Federal lands within the Northwest Forest Plan area through timber harvest, natural disturbance, or other management actions as documented through section 7 consultation and technical assistance. Range-wide changes by land-use function from 2006 to December 29, 2016.

Suitable Habitat (NRF) Effects	Reserves (LSR, MLSA, CRA)[3]	Non-reserves (AWA, AMA, Matrix)[3]	Totals
Evaluation Baseline (2006/2007)[2]	5,961,000	2,594,200	8,555,200
Removed/Downgraded (timber harvest only)[4]	8,781	45,667	54,448
Removed/Downgraded (other management activities)[5]	3,660	2,603	6,263
Subtotal	12,441	48,270	60,711
Removed/Downgraded (natural disturbance)[6]	44,338	38,349	82,687
Total Net Change	56,779	86,619	143,398
Baseline Balance	5,904,221	2,507,581	8,411,802
Habitat Maintained[7]	55,641	145,996	201,637

Notes:

1.Nesting, roosting, foraging (NRF) habitat. In WA/OR, the values for Nesting/Roosting habitat generally represent the distribution of suitable owl habitat, including foraging habitat. In CA, foraging habitat occurs in a much broader range of forest types than what is represented by nesting/roosting habitat. Baseline information for foraging habitat as a separate category in CA is currently not available at a provincial scale. Effects to spotted owl habitat in California reported here include effects to Nesting/Roosting habitat only. Foraging habitat removed or downgraded in California is not summarized in this table.

2.Spotted owl nesting and roosting habitat on all Federal lands (includes USFS, BLM, NPS, DoD, USFWS, etc.) as reported by Davis et al. 2011 for the the Northwest Forest Plan 15-Year Monitoring Report (PNW-GTR-80, Appendix D). NR habitat acres are approximate values based on 2006 (OR/WA) and 2007 (CA) imagery.

3.Reserve land use allocations under the NWFP intended to provide demographic support for spotted owls include LSR, MLSA, and CRA. Non-reserve allocations under the NWFP intended to provide dispersal connectivity between reserves include AWA, AMA, and MX.

4. NRF habitat removed or downgraded from timber harvest on Federal lands.

5. NRF habitat removed or downgraded from recreation, roads, minerals, or other non-timber programs.

6. NRF habitat losses resulting from wildfires, insect and disease, windthrow or other natural causes.

7. Habitat maintained means that stands have been modified by management, but the habitat function remains the sameNesting, roosting, foraging (NRF) habitat. In WA/OR, the values for Nesting/Roosting habitat generally represent the distribution of suitable owl habitat, including foraging habitat. In CA, foraging habitat occurs in a much broader range of forest types than what is represented by nesting/roosting habitat. Baseline information for foraging habitat as a separate category in CA is currently not available at a provincial scale. Effects to spotted owl habitat in California reported here include effects to Nesting/Roosting habitat only. Foraging habitat removed or downgraded in California is not summarized in this table.

Table 27 summarizes the effects to habitat from natural disturbance and management action by land use function. The ECOS database indicates that about 60 percent of total rangewide losses are within non-reserved land allocations (86,619 of total 143,398 acres lost). About 42 percent of the total loss is attributed to management activities (60,711of 143,398 acres lost). Additionally, natural disturbance factors have affected more reserved land allocations than in non-reserves (40,338 verses about 38,349 acres).

Spotted Owl Population Trends and Distribution

There are no estimates of the historical population size and distribution of spotted owls, although they are believed to have inhabited most old-growth forests throughout the Pacific Northwest prior to modern settlement (mid-1800s), including northwestern California (USFWS 1989, pp. 2-17).

The current range of the spotted owl extends from southwest British Columbia through the Cascade Mountains, coastal ranges, and intervening forested lands in Washington, Oregon, and California, as far south as Marin County (USFWS 1990a, p. 26114). The range of the spotted owl is partitioned into 12 physiographic provinces (Figure 2) based on recognized landscape subdivisions exhibiting different physical and environmental features (USFWS 1992a, p. 31). The spotted owl has become rare in certain areas, such as British Columbia, southwestern Washington, and the northern coastal ranges of Oregon.

Population estimates are difficult to achieve on wide-ranging species such as the Spotted owl. As of July 1, 1994, there were about 5,430 known site-centers of spotted owl pairs or resident singles: about 85 sites (16 percent) in Washington, 2,890 sites (53 percent) in Oregon, and 1,685 sites (31 percent) in California (USFWS 1995, p. 9495). The totals above represent the cumulative number of locations recorded in the three states, not population estimates. Estimated populations were modeled during the 2012 critical habitat designation which projected a steady-state range-wide population size of roughly 3,400 female spotted owls. Population sizes varied regionally from low in the north, especially the northwest (*e.g.*, about 100 in the North Coast Olympics and West Cascades North modeling regions), to high in parts of southern Oregon and northern California (*e.g.*, about 750 each in the Inner California Coast, Klamath East, Klamath West, Redwood Coast, and West Cascades South modeling regions) (Dunk *et al*., 2012, p. 64). These estimates likely over represent the numbers of females as this modeling effort was based on 2008 spotted owl data and does not reflect subsequent declines over the last seven years. Additionally, the actual number of currently occupied spotted owl locations across the range is unknown because many areas remain un-surveyed (USFWS 2011b, p. A-2) and many historical sites are no longer occupied because spotted owls have been displaced by barred owls, timber harvest, or severe fires. Additionally, it is possible that some new sites have been established due to reduced timber harvest on Federal lands since 1994.

Because the existing survey coverage and effort are insufficient to produce reliable range-wide estimates of population size, demographic data are used to evaluate trends in spotted owl populations. Analysis of demographic data can provide an estimate of the finite rate of population change (λ), which provides information on the direction and magnitude of population change. A λ of 1.0 indicates a stationary population, meaning the population is neither increasing nor decreasing. A λ of less than 1.0 indicates a decreasing population, and a λ of greater than 1.0 indicates a growing population. Demographic data are analyzed periodically to estimate trends in the populations of the spotted owl.

As described above, after the implementation of the NWFP, populations were expected to decline in the short term, and then stabilize or increase after 50–100 years (Thomas *et al*. 1990, Lint *et al*. 1999). Previous demographic analyses suggested that populations confirmed this projection; however, the rates of decline began to increase after 2009 (Dugger *et al*., 2016, Table 26, p.97) although rates have varied among study areas (Franklin *et al*. 1999, Anthony *et al*. 2006, Forsman *et al*. 2011).

The most recent meta-analysis results suggest that the rates of decline have now increased range-wide, as summarized below (Dugger *et al*., 2016, entire). Estimated declines in annual rates of population change and occupancy rates were found to continue from past reports in all parts of their range (Table 28). That rate of decline was increasing in many areas, including southern Oregon and northern California (Dugger *et al*., 2016, p. 91).

Table 28. Summary of spotted owl population trends from in demographic study areas (Dugger *et al*., 2016, Table 25, p.97).

Study Area	**Fecundity**	**Apparent Survival**[a]	**Occupancy Rates**	**Mean Population change / population change**	**% Population Change**[1]
Cle Elum	**Declining**	**Declining**	**Declining**	0.916/No trend	-77%
Rainier	No trend	**Declining**	**Declining**	0.953/No trend	-61%
Olympic	No trend	No trend	**Declining**	0.961/No trend	-59%
Coast Ranges	**Declining**	No trend	**Declining**	0.949/**Declining**	-64%
HJ Andrews	**Declining**	**Declining**	**Declining**	0.965/**Declining**	-47%
Tyee	**Declining**	**Declining**	**Declining**	0.976/**Declining**	-31%
Klamath	**Declining**	No trend	**Declining**	0.972/**Declining**	-34%
Southern Cascades	No trend	**Declining**	**Declining**	0.963/No trend	-44%
NW California	**Declining**	**Declining**	**Declining**	0.970/**Declining**	-55%
Hoopa	**Declining**	**Declining**	**Declining**	0.977/**Declining**	-32%
Green Diam. - CB	**Declining**	**Declining**	**Declining**	0.988/**Declining**	-31%
Green Diam. - TB	**Declining**	**Declining**	**Declining**	0.961/**Declining**	-26%
Green Diam. - CA	**	**	**Declining**	0.878/**	-41%
Green Diam. - TA	**	**	N/A[2]	1.030/**	-9%-

[1] With the exception of the Green Diamond study area, percent population change was based on estimates of *realized population change* in 2011, the last year for which an estimate of population change could be generated.

[2] Data used for occupancy modeling in the GDR study area excluded treatment areas after Barred Owl removals began in 2009.

** Too few years since Barred Owl removal to evaluate a trend.

CB = control area before barred owl removal; TB=treatment area before removal; CA=control area after removal; TA= treatment area after removal

Individual study area *annual rates of population change* (λ) were based on capture histories for 5,992 territorial owls from all age classes. Almost all study areas showed declining population trends, with strong evidence of declines in all of Washington study areas, the coastal and HJ Andrews study areas in Oregon and three California study areas. Less of a decline was found Tyee, Klamath, and Cascades study areas of Oregon. The only study area with an increasing population was observed in Green Diamond treatment areas after barred owl removals began in 2009 (GDR-TA). The rates of decline were variable across the range; the highest were in Green Diamond control areas (GDR-CA) after 2009 (12.0 percent annual decline), and the Washington Cle Elum study area (8.4 percent), and the lowest was in the Green Diamond before barred owl removals began in treatment areas in 2009 (1.2 percent annual decline). The weighted mean population change for all study areas (excluding GDR-TB) was an estimated decline of 3.8 percent per year from 1985-2013 (Dugger *et al*., 2016, p.70-71). This is an increase from 2.8 percent reported by Forsman *et al*., 2011).

Recent estimates of *realized population change* (change in populations since studies were initiated) showed sharper declines in the northern portion of the range. Populations in Washington declined by 55–77 percent; sites in Oregon ranged from 31 percent in TYE to 68 percent in COA, with two cases more uncertain (KLA and TYE). The 95 percent confidence intervals in these sites widely overlapped 1.0 for most or all of the last several years. Declines in California, ranged from 32 – 55 percent, with exceptions in HUP and treatment areas of GDR T where confidence limits overlapped 1.0 in many years, indicating uncertainty about annual rates of population change in these areas.

Decreases in adult apparent survival rates were an important factor contributing to decreasing population trends. Dugger *et al*., 2016 (p.58) found strong evidence that barred owls negatively affected spotted owl populations, largely from increasing local territory extinction rates and decreasing apparent survival. The amount of suitable habitat, local weather, and regional climatic patterns also were related to survival, occupancy (via colonization rate), and recruitment. Associated effects to fecundity were weaker. Five of the 11 study areas included either a negative linear or log-linear time trend on survival.

There are few spotted owls remaining in British Columbia. Chutter *et al*. (2004, p. v) suggested immediate action was required to improve the likelihood of recovering the spotted owl population in British Columbia. In 2007, personnel in British Columbia captured and brought into captivity the remaining 16 known wild spotted owls (USFWS 2011b, p. A-6). Prior to initiating the captive-breeding program, the population of spotted owls in Canada was declining by as much as 10.4 percent per year (Chutter *et al*. 2004, p. v). The amount of previous interaction between spotted owls in Canada and the United States is unknown.

Spotted Owl Recovery Units

The 2011 Final Revised Recovery Plan for the Spotted owl determined that the 12 existing physiographic provinces meet the criteria for use as recovery units (USFWS 2011b, p. III 1-2). The proposed project is within the California Klamath Physiographic Province (Ibid, p. A-2).

Recovery criteria, as described in the 2011 Final Revised Recovery Plan (p. 11-3), are measurable and achievable goals that are believed to be achievable through implementation of the recovery actions described in the recovery plan. Achievement of the recovery criteria will take time and is intended to be measured over the life of the plan, not on a short-term basis. The criteria are the same for all 12 identified recovery units. The four recovery criteria are: 1) stable population trend, 2) adequate population distribution, 3) continued maintenance and recruitment of spotted owl habitat, and 4) post-delisting monitoring (USFWS 2011b, p III-3).

As discussed above, demographic data are used to evaluate trends in spotted owl populations. In the recent meta-analysis, California showed similar overall trends as other study areas throughout the range. One Demographic Study Area most resembling the Westside action area occurs within the California Klamath Province (Northwest California study area in Willow Creek (NWC)).The Hoopa Study Area also occurs in the Klamath Province and is composed of mixed-conifer vegetation types, but with a much more significant tanoak component than found in NWC or the Westside action area. Spotted owls in the NWC study area were found to have declining trends in fecundity, apparent survival, and population trends. In particular, strong evidence for declines was found in all areas in California. These findings are similar to other study areas across the range, where the overall results suggest that the influences of barred owls could be the primary cause of spotted owl rangewide population declines. Where barred owls were present, there were corresponding declines in apparent survival and increased local extinction rates of spotted owls, and a positive association between barred owl removals and spotted owl demographic performance. Overall, across the range (California included), apparent survival and local extinction rates appeared to be the key vital rates through which barred owls influenced spotted owl populations. Also, the associations of habitat and demographic rates of spotted owls were similar to findings of previous studies which supported recommendations to preserve as much high-quality habitat in late-successional forests as possible across the range of the subspecies (see Dugger *et al*. 2016, p. 98).

STATUS OF CRITICAL HABITAT – NORTHERN SPOTTED OWL

Conservation Role of Critical Habitat

Critical habitat contains those areas that are essential to the conservation of the species.

The expectation of critical habitat is to ameliorate habitat-based threats. The recovery of the spotted owl requires habitat conservation in concert with the implementation of recovery actions that address other, non-habitat-based threats to the species, including the barred owl (USFWS 2012a, p. 71879). The conservation role of spotted owl critical habitat is to "adequately support the life-history needs of the species to the extent that well-distributed and inter-connected spotted owl nesting populations are likely to persist within properly functioning ecosystems at the critical habitat unit and range-wide scales" (USFWS 2012a, p. 71938). The specific conservation role of the subunits included in the action area is described in the Environmental Baseline in the document.

Physical or Biological Features

When designating critical habitat, the Service considers "the physical or biological features [PBFs] essential to the conservation of the species and which may require special management considerations or protection" (50 CFR §424.12; USFWS 2012a, p. 71897). "These include, but are not limited to: (1) space for individual and population growth and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing (or development) of offspring; and (5) habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species" (USFWS 2012a, p. 71897). The final critical habitat rule states that "for the spotted owl, the physical or biological features essential to the conservation of the species are forested areas that are used or likely to be used for nesting, roosting, foraging, or dispersing" (USFWS 2012a, p. 71897). The final critical habitat rule for the spotted owl provides an in-depth discussion of the PBFs, which may be referenced for further detail (USFWS 2012a, pp. 71897-71906).

The primary constituent elements (PCEs) are the specific elements of the PBFs that are considered essential to the conservation of the spotted owl and are those elements that make areas suitable as nesting, roosting, foraging, and dispersal habitat (USFWS 2012a, p. 71904) (In this biological opinion we use the term PBFs rather than PCEs in light of a recent amendment to our regulations. 81 FR 7414 (Feb. 11, 2016)). The PBFs should be arranged spatially such that it is favorable to the persistence of populations, survival, and reproductive success of resident pairs, and survival of dispersing individuals until they are able to recruit into a breeding population (USFWS 2012a, p. 71904). Within areas essential for the conservation and recovery of the spotted owl, the Service has determined that the PBFs are:

1) Forest types that may be in early-, mid-, or late-seral stages and that support the spotted owl across its geographic range;
2) Habitat that provides for nesting and roosting;
3) Habitat that provides for foraging;
4) Habitat to support the transience and colonization phases of dispersal, which in all cases would optimally be composed of nesting, roosting, or foraging habitat (PBFs 2 or 3), but which may also be composed of other forest types that occur between larger blocks of nesting, roosting, or foraging habitat (USFWS 2012a, pp. 72051-72052).

Some critical habitat subunits may contain all of the above PBFs and support multiple life history requirements of the spotted owl, while some subunits may contain only those PBFs necessary to support the species particular use of that habitat. All of the areas designated as critical habitat, however, do contain PBF 1, forest type. Therefore, PBF 1 always occurs in concert with at least one other PBF (PBF 2, 3, or 4; USFWS 2012a, p. 72051). Spotted owl critical habitat does not include meadows, grasslands, oak woodlands, aspen woodlands, or manmade structures and the land upon which they are located (USFWS 2012a, p. 71918).

PBF 1: Forest Types

The primary forest types that support the spotted owl are: Sitka spruce, western hemlock, mixed conifer, mixed evergreen, grand fir, Pacific silver fir, Douglas-fir, white fir, Shasta red fir, redwood/Douglas-fir, and moister ponderosa pine (USFWS 2012a, p. 72051).

PBF 2: Nesting and Roosting Habitat

Nesting and roosting habitat for spotted owl provides structural features for nesting, protection from adverse weather conditions, and cover to reduce predation risk for adults and young. In many cases, the same habitat may also provide for foraging. Nesting and roosting habitats must provide: sufficient habitat for foraging by territorial pairs, moderate to high canopy cover (60 to over 80 percent), multilayered and multispecies canopies with large overstory trees (20 to 30 inches dbh), basal area greater than 240 square feet per acre, high diversity of tree diameters, high incidence of large live trees with various deformities (*e.g.*, large cavities, broken tops, mistletoe infections, and other evidence of decadence), large snags and large accumulations of woody debris on the ground, and sufficient open space beneath the canopy for flight (USFWS 2012, p. 72051).

PBF 3: Foraging Habitat

Across the range of the spotted owl, nesting and roosting habitats also provide foraging opportunities; however, spotted owls may use other habitat types for foraging as well. The components of PBF 3 for spotted owl foraging habitat include younger forests with some structural characteristics of older forest (legacy features), stands of nesting and roosting habitat and other forest types with mature and old-forest characteristics, presence of conifer species (such as incense-cedar, sugar pine, and Douglas fir) and hardwood species (such as bigleaf maple, black oak, live oaks, and madrone) as well as shrubs, forest patches within riparian zones of low-order streams and edges between conifer and hardwood forest stands, brushy openings and dense young stands or low-density forest patches within a mosaic of mature and older forest habitat, high canopy cover (87 percent at frequently used sites), multiple canopy layers, mean stand diameter greater than 21 inches, increasing mean stand diameter and densities of trees greater than 26 inches which increase foraging habitat quality, large accumulations of fallen trees and other woody debris on the ground, and sufficient open space below the canopy for spotted owls to fly (USFWS 2012a, p. 72051-72052).

PBF 4: Dispersal habitat

Spotted owl dispersal habitat is habitat that supports the transience and colonization phases of owl dispersal, and in all cases would optimally be composed of nesting, roosting, or foraging habitat (PBF 2 or 3), but which may also be composed of other forest types that occur between larger blocks of spotted owl nesting, roosting, or foraging habitat. In cases where nesting, roosting, or foraging habitats are insufficient to provide for dispersing or nonbreeding owls, the specific dispersal PBFs are: habitat supporting the transience phase of dispersal (protection from avian predators, minimal foraging opportunities, younger and less diverse forests that provide some roosting structures and foraging opportunities) and habitat supporting the colonization phase of dispersal (nesting, roosting, and foraging habitat but in smaller amounts than needed to support a nesting pair) (USFWS 2012a, p. 72052).

Current Condition of Spotted owl Critical Habitat

The current condition of critical habitat incorporates the effects of all past human activities and natural events that led to the present-day status of the habitat (USDI and USDC 1998, p. 4-19). With the revision of spotted owl critical habitat, the range-wide condition has been “reset” as of December 4, 2012.

Range-Wide Critical Habitat Baseline

A number of data sources can be used to evaluate critical habitat baseline. The Service updated the ECOS Database to reflect the 2006/2007 habitat baseline developed for the NWFP 15-year monitoring report (Davis *et al*. 2011, Appendix D, Table D). At the time of this writing, these data have not been updated within the ECOS database to reflect baseline data reported in the NWFP 20-year monitoring report (Davis *et al*., 2015). The database indicates that approximately 9.577 million acres of spotted owl critical habitat existed in 2006/2007 (Table 29). The tracking database quantifies effects to critical habitat by physiographic provinces rather than designated units and subunits, which makes it problematic to compare incremental changes in specific areas of interest such as subunits. As of December 29, 2016, the database reports consulted on actions that have removed or downgraded about 11,285 acres from 2012 critical habitat range-wide, and an additional 15,081 acres lost from natural events.

Table 29. Summary of spotted owl critical habitat NRF[1] acres removed or downgraded as documented through section 7 consultations on Northwest Forest Plan (NWFP) lands; environmental baseline and summary of effects by State, Physiographic Province and Land Use Function.

Physiographic Province[2]		Evaluation Baseline		Habitat Removed/Downgraded					% Provincial Baseline Affected	% Range-wide Effects
				Land Use Allocations[5]			Habitat Loss to Natural Events	Total		
		Total Designated Critical Habitat Acres[3]	Nesting/Roosting Acres[4]	Reserves	Non-Reserves	Total				
WA	Eastern Cascades	1,022,960	416,069	265	2	267	3,895	4,162	1	0.90
	Olympic Peninsula	507,165	238,390	6	0	6	0	6	0	0.02
	Western Cascades	1,387,567	667,173	268	43	311	0	311	0.05	1.05
OR	Cascades East	529,652	181,065	893	1,460	2,353	0	2,353	1.3	7.27
	Cascades West	1,965,407	1,161,780	651	3,804	4,455	662	5,117	0.44	16.86
	Coast Range	1,151,874	535,602	1	695	696	0	696	0.13	3.82
	Klamath Mountains	911,681	481,577	1,324	1,152	2,476	3,011	5,487	1.14	18.59
CA	Cascades	243,205	98,243	0	67	67	0	67	0.07	0.00
	Coast	149,044	58,278	0	0	0	2,018	2,018	3.46	9.71
	Klamath	1,708,787	752,131	242	412	654	5,495	6,149	0.82	41.78
Total		9,577,342	4,590,308	3,650	7,635	11,285	15,081	26,366	0.28%	100%

Notes:

1. Nesting, roosting, foraging (NRF) habitat. In California, suitable habitat is divided into two components; nesting - roosting (NR) habitat, and foraging (F) habitat. The NR component in CA most closely resembles NRF habitat in Oregon and Washington.
2. Defined in the Revised Recovery Plan for the Spotted owl (USFWS 2011b) as Recovery Units as depicted on p. A-3.
3. Spotted owl critical habitat as designated December 4, 2012 (77 FR 71876). Total designated critical habitat acres listed here (9,577,342 acres) are derived from GIS data, and vary slightly from the total acres (9,577,969 acres) listed in the Federal Register (-627 acres).
4. Calculated from GIS data for spotted owl Nesting/Roosting habitat generated by Davis *et al*. 2011 for the Northwest Forest Plan 15-year Monitoring Report (PNW-GTR-850). NR habitat acres are approximate values based on 2006 (OR/WA) and 2007 (CA) satellite imagery.
5. Reserve land use allocations under the NWFP intended to provide demographic support for spotted owls include LSR, MLSA, and CRA. Non-reserve allocations under the NWFP intended to provide dispersal connectivity between reserves include AWA, AMA, and MX.

Zones of Habitat Associations used by Spotted owls

Differences in patterns of habitat associations used by the spotted owl across its range suggest four different broad zones of habitat use, which we characterize as the (1) West Cascades/Coast Ranges of Oregon and Washington, (2) East Cascades, (3) Klamath and Northern California Interior Coast Ranges, and (4) Redwood Coast (Figure 3). We configured these zones based on a qualitative assessment of similarity among ecological conditions and habitat associations within the 11 different regions analyzed during the critical habitat designation process (see USFWS 2012a). These four zones capture the range in variation of some of the PBFs essential to the conservation of the spotted owl. Summarized below are the PBFs for each of these four zones, emphasizing zone-specific features that are distinctive within the context of general patterns that apply across the entire range of the spotted owl.

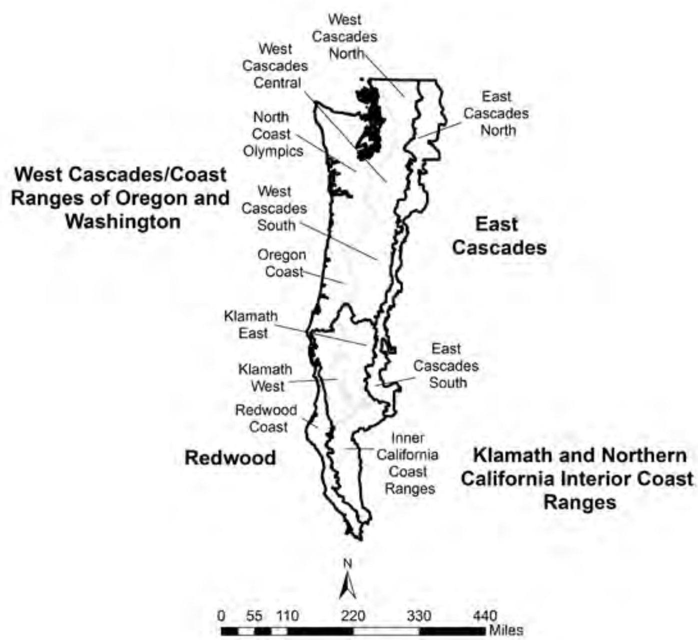

Figure 3. Eleven regions and four zones of habitat associations used by spotted owls in Washington, Oregon, and California.

West Cascade/Coast Ranges of Oregon and Washington

This zone includes five regions west of the Cascade crest in Washington and Oregon (Western Cascades North, Central and South; North Coast Ranges and Olympic Peninsula; and Oregon Coast Ranges; USFWS 2011b, p. C–13). Climate in this zone is characterized by high rainfall and cool to moderate temperatures. Variation in elevation between valley bottoms and ridges is relatively low in the Coast Ranges, creating conditions favorable for development of contiguous forests. In contrast, the Olympic and Cascade ranges have greater topographic variation with many high-elevation areas supporting permanent snowfields and glaciers. Douglas-fir and western hemlock dominate forests used by spotted owls in this zone. Root diseases and wind-throw are important natural disturbance mechanisms that form gaps in forested areas. Flying squirrels (*Glaucomys sabrinus*) are the dominant prey, with voles and mice also representing important items in the spotted owl's diet.

Our habitat modeling indicates that vegetation structure has a dominant influence on owl population performance, with habitat pattern and topography also contributing. High canopy cover, high density of large trees, high numbers of sub-canopy vegetation layers, and low to moderate slope positions are all important features.

Nesting habitat in this zone is mostly limited to areas with large trees with defects such as mistletoe brooms, cavities, or broken tops. The subset of foraging habitat that is not nesting/roosting habitat generally had slightly lower values than nesting habitat for canopy cover, tree size and density, and canopy layering. Prey species (primarily the northern flying squirrel) in this zone are associated with mature to late-successional forests, resulting in small differences between nesting, roosting, and foraging habitats.

East Cascades

This zone includes the Eastern Cascades North and Eastern Cascades South regions (USFWS 2011b, p. C–13). This zone is characterized by a continental climate (cold, snowy winters and dry summers) and a high frequency of natural disturbance due to fires and outbreaks of forest insects and pathogens. Flying squirrels are the dominant prey species, but the diet of spotted owls in this zone also includes relatively large proportions of bushy-tailed woodrats (*Neotoma cinerea*), snowshoe hare (*Lepus americanus*), pika (*Ochotona princeps*), and mice (*Microtus* spp. (Forsman *et al*. 2001, pp. 144–145).

Our modeling indicates that habitat associations in this zone do not show a pattern of dominant influence by one or a few variables (USFWS 2011b, Appendix C). Instead, habitat association models for this zone included a large number of variables, each making a relatively modest contribution (20 percent or less) to the predictive ability of the model. The features that were most useful in predicting spotted owl habitat quality were vegetation structure and composition, and topography, especially slope position in the north. Other efforts to model habitat associations in this zone have yielded similar results (*e.g.*, Gaines *et al*. 2010, pp. 2048–2050; Loehle *et al*. 2011, pp. 25–28).

Relative to other portions of the spotted owls' range, nesting and roosting habitat in this zone includes relatively younger and smaller trees, likely reflecting the common usage of dwarf mistletoe (*Arceuthobium douglasii*) brooms (dense growths) as nesting platforms (especially in the north). Forest composition that includes high proportions of Douglas-fir is also associated with this nesting structure. Additional foraging habitat in this zone generally resembles nesting and roosting habitat, with reduced canopy cover and tree size, and reduced canopy layering. High prey diversity suggests relatively diverse foraging habitats are used. Topographic position was an important variable, particularly in the north, possibly reflecting competition from barred owls (Singleton *et al*. 2010, pp. 289, 292). Barred owls, which have been present for over 30 years in the northern portions of this zone, preferentially occupy valley-bottom habitats, possibly compelling spotted owls to establish territories on less productive, mid-slope locations (Singleton *et al*. 2010, pp. 289, 292).

Klamath and Northern California Interior Coast Ranges

This zone includes the Klamath West, Klamath East, and Interior California Coast regions (USFWS 2011b, p. C–13). The action area occurs within the California Klamath physiographic province, but the affected critical habitat subunits, as defined in the critical habitat rule, overlap into the western edge of the Southern Cascades. These areas in northern California and southwestern Oregon are characterized by very high climatic and vegetative diversity resulting from steep gradients of elevation, dissected topography, and large differences in moisture from west to east. The western portions of this zone support a diverse mix of mesic forest communities interspersed with drier forest types that increase to the east into the Cascades. Forests of mixed conifers and evergreen hardwoods are typical of the zone. The mixed-conifer/evergreen hardwood forest types typical of the Klamath region extend into the southern Cascades in the vicinity of Roseburg and the North Umpqua River, where they grade into the western hemlock forest typical of the Cascades. Douglas-fir/dwarf mistletoe is less commonly used for nesting platforms in the western part of the spotted owl's range, but is commonly used in the east. The prey base for spotted owls in this zone is correspondingly diverse, but dominated by dusky-footed woodrats, bushy-tailed woodrats, and flying squirrels. Spotted owls have been well studied in the western Klamath portion of this zone (Forsman *et al*. 2004, p. 217), but relatively little is known about spotted owl habitat use in the eastern portion of this zone.

Our habitat association models for this zone suggest that vegetation structure and topographic features are nearly equally important in influencing owl population performance, particularly in the Klamath. High canopy cover, high levels of canopy layering, and the presence of very large dominant trees were all important features of nesting and roosting habitat. Compared to other zones, additional foraging habitat for this zone showed greater divergence from nesting habitat, with much lower canopy cover and tree size. Low to intermediate slope positions were strongly favored. In the eastern Klamath, the presence of Douglas-fir was an important compositional variable in our habitat model (USFWS 2011b, Appendix C).

Redwood Coast

This zone is confined to the northern California coast, and is represented by the Redwood Coast region (USFWS 2011b, p. C–13). It is characterized by a maritime climate with moderate temperatures and generally mesic conditions. Near the coast, frequent fog delivers consistent moisture during the summer. Terrain is typically low-lying (0 to 3,000 feet). Forest

communities are dominated by redwood, Douglas-fir–tanoak (*Lithocarpus densiflorus*) forest, coast live oak (*Quercus agrifolia*), and tanoak series.

Dusky footed woodrats are the dominant prey items for spotted owls in this zone.

Habitat association models for this zone diverged strongly from models for other zones. Topographic variables (slope position and curvature) had a dominant influence with vegetation structure having a secondary role. Low position on slopes was strongly favored, along with concave landforms. Several studies of spotted owl habitat relationships suggest that stump-sprouting and rapid growth of redwood trees, combined with high availability of woodrats in patchy, intensively managed forests, enables spotted owls to occupy a wide range of vegetation conditions within the redwood zone. Rapid growth rates enable young stands to develop structural characteristics typical of older stands in other regions. Thus, relatively small patches of large remnant trees can also provide nesting habitat structure in this zone.

Climate Change and Range-wide Spotted Owl Critical Habitat

There is growing evidence that recent climate change has impacted a wide range of ecological systems (Stenseth *et al*. 2002, entire; Walther *et al*. 2002, entire; Ådahl *et al*. 2006, entire; Karl *et al*. 2009, entire; Moritz *et al*. 2012, entire; Westerling *et al*. 2011, p. S459; Marlon *et al*. 2012, p. E541). Climate change, combined with effects from past management practices, is exacerbating changes in forest ecosystem processes and dynamics to a greater degree than originally anticipated under the NWFP. Environmental variation affects all wildlife populations; however, climate change presents new challenges as systems may change beyond historical ranges of variability. In some areas, changes in weather and climate may result in major shifts in vegetation communities that can persist in particular regions. The potential impact of climate change will affect the environmental baseline for the northern spotted owl, and we provide a general overview of these potential effects in Appendix D.

Climate change will present unique challenges to the future of spotted owl populations and their habitats. Spotted owl distributions (Carroll 2010, entire) and population dynamics (Franklin *et al*. 2000, entire; Glenn *et al*. 2010, entire; Glenn *et al*. 2011a, entire; Glenn *et al*. 2011b, entire) may be directly influenced by changes in temperature and precipitation. In addition, changes in forest composition and structure as well as prey species distributions and abundance resulting from climate change may impact availability of habitat across the historical range of the subspecies. The *2011 Spotted owl Revised Recovery Plan* provides a detailed discussion of the possible environmental impacts to the habitat of the spotted owl from the projected effects of climate change (USFWS 2011b, pp. III-5 to III-11).

Because both spotted owl population dynamics and forest conditions are likely to be influenced by large-scale changes in climate in the future, we have attempted to account for these influences in our designation of critical habitat by recognizing that forest composition may change beyond the range of historical variation, and that climate changes may have unpredictable consequences for both Pacific Northwest forests and spotted owls. Our critical habitat designation also recognizes that forest management practices that promote ecosystem health under changing climate conditions will be important for spotted owl conservation.

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APPENDIX F: Recovery Action 10
Priority Site Ranking

The following Recovery Action 10 priority site ranking is from the BA (FS 2016, pp. 236-244).

Background and Need

The Revised Northern Spotted Owl Recovery Plan (the recovery plan) of June 28, 2011 contains 33 recovery actions to promote recovery of the Northern spotted owl; one of which is Recovery Action 10 (RA10).

Recovery Action 10 – Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population. (recovery plan, p. III-43).

This recovery action recommends conservation and restoration priorities for known and potential sites, and high value habitat based on considerations of site occupation and reproduction status, plus habitat conditions within the core area and provincial range. "*The intent of this recovery action is to protect, enhance and develop habitat in the quantity and distribution necessary to provide for the long-term recovery of spotted owls"* (p. III-44).

Recovery Action 10 (RA 10) recommends: "For Federal lands, create an interagency scientific team to use the latest and best available habitat modeling information and other data to identify these high value areas [high-value habitat and potential sites in unsurveyed habitat]. This team will make recommendations for areas to conserve and manage…" (p. III-42).

The recovery plan further recommends interim guidance to be applied to achieve the intent of RA10 until such interagency teams are convened and further guidance provided. "*When planning management activities, Federal and no-federal managers should work with the Service to prioritize known and historic spotted owl sites for conservation and/or maintenance of existing levels of habitat."* (p. III-44). *"In unsurveyed spotted owl habitat, the agencies and the Service should work cooperatively through the Endangered Species Act consultation process to minimize impacts to potential spotted owl sites"* (recovery plan, p. III-45)

RA 10 prioritization process used in this BA

Prioritization is intended to provide a "guide to evaluate the relative impacts of management actions, and conservation of sites that provide the most support to spotted owl demography" (recovery plan, p. III-44). In order to prioritize site conservation and habitat restoration, to analyze the effects of actions relative to RA10, and otherwise assess consistency with RA10, it was necessary to prioritize known and potential sites (unsurveyed suitable habitat). The prioritization method used in this BA incorporates RA10 considerations for site occupation, pair and reproduction status, in combination with habitat conditions in the 0.5 mile Core Area and 1.2 mile Provincial Home Range.

<u>The use of these prioritizations is solely to assess and describe actions relative to RA10</u>. There is no change to other existing standards of the BA, including effects determinations based on two consecutive years of protocol surveys indicating a site to be "temporarily unoccupied". The prioritization does not imply that any site, or unsurveyed habitat, is not providing current or future value for spotted owl recovery. Survey data have shown that unoccupied sites may be reoccupied at any time, if habitat is sufficient. The prioritization method incorporated the concept of historic sites without the need to define them specifically.

The definition of a Potential Site is more fully described in Appendix E of this BA. Table F-2 describes and defines the terminology used in the RA10 prioritization approach in this BA. A few of these terms are further discussed below.

"Occupation Status" indicates whether or not owls were present at a site in a given year and their pair status. If owls were present, occupation status was categorized as either a single individual or a pair. If owls were absent, occupation status was categorized as "**Unoccupied"** or **"Unknown".** A Yearly Site Status of Unoccupied was derived only when a 6-visit valid Protocol Visit regime (or another survey methodology approved by the USFWS) was conducted and no owls were detected. Yearly Site Status was assessed as **"Unknown**" when no owls were detected but survey protocol methods were not used to verify occupancy status.

"**Reproduction Status**" indicates whether or not a spotted owl pair attempted to nest at site in a given year. Annual outcomes are categorized as "Nesting" or "Unknown". (NOTE: some protocols describe methods to confirm "Non-Nesting" in a given year, versus an assumption of Unknown).

Occupation and Reproduction status outcomes may vary slightly from accepted survey or monitoring protocol status determinations. Any differences were solely to apply a simplified approach to prioritizing and managing for sites consistent with RA10. Definitions are not intended to alter other existing survey or monitoring protocol status definitions used for other purposes.

"**Protocol Visits (or Surveys)"** were defined as survey (or monitoring) visits to a site that covered an appropriate amount of site area and were consistent with the timing, spacing and methods as described in an accepted survey protocol (or other survey regime approved by the USFWS).

A "**Survey Year"** was one comprised of the proper amount of Protocol Visits to arrive at a Yearly Site Status. This appendix is based on the 6-visit recommendation found in the USFWS survey protocol. With approval of the USFWS, other survey/monitoring protocols that require fewer visits may be used (e.g. Demography Study Area 3-visit protocols for sites therein). The concept of Protocol Visits and a valid Survey Year become most important when determining whether a site was unoccupied in a given year, and ultimately its RA10 Priority number.

"Yearly Site Status": This was assessed by using survey results to determine known occupation, pair, and reproductive status at a site in a given year; including surveys determining a status of "Unoccupied". When site surveys were not conducted, or were not completed to recommended protocol standards (method, timing, amount, area covered), and status determinations were not made; the Yearly Site Status was determined to be Unknown (see both "General" and "Historic Status" processes for incorporating Yearly Status results into a RA10 Priority in the complete, or partial, absence of surveys accompanied by lack of status determinations).

"RA10 Priority": The RA10 Priority is a *summarization* of previous Yearly Site Status results (or lack of) over multiple years. This represents a *relative* priority for conservation and restoration among all sites in a local field unit.

The lower the RA10 Priority number, the *higher* the priority for conservation that maintains site capability for pair occupation and reproduction as recommended in RA10. For example, RA10 Priority number 1 sites are those most valuable to conserve consistent with RA10.

Conversely, the higher the RA10 Priority number for a site, the *lower* its priority for conservation and the higher its priority for restoration treatments if unoccupied (e.g. thinning harvest). For example, RA10 Priority number 10 sites are the lowest priority for conserve in accord with RA10.

Within this Appendix, it is important to note any distinctions between same or similar terms that may have different definitions for Yearly Site Status versus RA10 Priority (e.g., Unoccupied status).

Processes to Determine the RA10 Priority:

General Process (sites with recent surveys):

The prioritization process used the following hierarchical considerations: recent survey information, historic survey information, and unsurveyed potential sites (in that order). For sites with recent surveys, the Yearly Site Status was compiled for the 5 most recent Survey Years within the last 10 calendar years. The ''highest" Yearly Site Status was used to derive the RA10 Priority. Status hierarchy from highest to lowest was as follows: nesting pair, non-nesting pair, single, and unoccupied. The highest status was then combined with habitat conditions in the core area and provincial home range to determine a final RA10 Priority. Years without valid protocol surveys and no owl detections (non-Survey Years) were not incorporated into RA10 priorities. The RA10 Priority criteria are summarized in Table F-1. A RA10 Priority status of "Unoccupied" was determined when there were at least 5 Survey Years with a Yearly Site Status of Unoccupied within the last 10 calendar year; *and* this status occurred in the previous 3 consecutive calendar years. If this condition was not met, the Historic Status Process below was used to determine the RA10 Priority.

Historic Status Process (sites without a sufficient number or type of recent surveys):

Historic Sites with no Survey Years in the last 10 calendar years: If any of the following situations applied to a site, one of two Historic Status Processes described below was used to determine RA10 Priority:

- No surveys were conducted at the site; *and/or*

1. Conducted surveys were non-protocol due to being inconsistent or incomplete with regards to methods, timing, amount or area covered and no spotted owls were detected (i.e., no valid Survey Years); *and/or*
2. Valid surveys were done which resulted in an Unoccupied status; but this status was not achieved at least 5 times in the last 10 years and for the 3 consecutive previous years.

1) Under the above scenario, if a known site had habitat above both the 50/40% thresholds in the core area and provincial home range respectively, the site was given a RA10 Priority of *1-Known Site with Reproductive Pair and Habitat Above Both Thresholds.* These unsurveyed sites were assessed a priority number the same as those with known reproductive pairs found by survey. This logic is consistent with the common consultation assumption that unsurveyed suitable habitat is occupied and accommodates RA10 objectives of conserving habitat that could reasonably be expected to support reproductive pairs.

2) Under the same above scenario, if a known site had habitat below one or both of the 50/40% thresholds in the core area and provincial home range respectively, the highest occupation and reproduction status since 1990 was used to determine the RA10 Priority.

Older sites without recent survey data: Some known sites have not been surveyed since 1990. For known sites with no valid Survey Years, and no indication of spotted owl presence after 1989, local biologists decided how to assign a RA10 Priority based on current habitat and survey history. If these types of known sites have ample habitat to support resident spotted owls, they were considered relevant to species recovery and RA10 direction, and therefore at least as important as Potential Sites with regards to

RA10 Priority. Future survey of these sites would ensure the best available information is used to determine their RA10 Priority.

Sites with spotted owl presence and incomplete survey data: When non-protocol surveys indicated owl presence at a site, but did not fully determine occupation or reproduction status; the local field unit biologists decided how to use this information to assess the Yearly Site Status and/or RA10 Priority.

As example: Two surveys occurred over a minority portion of a known site area and only a single owl was detected. Depending on the amount and location of the area covered by surveys, habitat, recent site status and activity areas, and other local knowledge, the local biologist may have assumed a status ‘’higher than’’ a single owl for the RA10 Priority.

Example Scenarios for Determining RA10 Priority*:*

Example 1: A known site with 5 valid Survey Years in the last 7 calendar years and spotted owls detected. RA10 Priority assessed using the General Process:

A known site, with habitat below both of the 50/40% thresholds in the core area and provincial home range respectively, had 5 valid Survey Years within the last 7 calendar years. Surveys resulted in: a nesting pair once, a non-nesting pair once, a single owl once, and a status of Unoccupied twice. No surveys occurred in 2 of the calendar years. Under this scenario, the highest occupation and reproduction status within the last seven calendar years is used to determine the RA10 Priority. This resulted in a RA10 Priority of *2* (regardless of what year the nesting pair was detected or what years surveys did not occur) (see **Table H- 1**).

Example 2: A known site with valid Survey Years and no spotted owls detected. RA10 Priority assessed using the General Process:

A known site, with habitat above both of the 50/40% thresholds in the core area and provincial home range respectively, had 5 consecutive Survey Years with no owls detected. The site was given a RA10 Priority of *8 (see* **Table H- 1***).*

Example 3: A known site without recent Survey Years (incomplete or no surveys) and no owl detections. RA10 Priority is assessed using the Historic Status Process:

A known site with habitat below both the 50/40% thresholds in core area and provincial home range respectively, received sporadic and incomplete surveys over the last 10 calendar years. Within the last 10 calendar years, the site was fully surveyed to protocol and had a status of Unoccupied in 2 non-consecutive years; no owls were detected during partial surveys (amount and/or area covered) that occurred in 5 years; and no surveys occurred in 3 years. Since, within the last 10 calendar years, no owls were detected, and there was an insufficient amount and timing of visits to result in a status of Unoccupied, the highest status of “single owl” from historic 1999 surveys was used to determine the RA10 Priority (see **Table H- 1**).

Table H- 1. Recovery Action 10: Current status and site prioritization used in this BA.

RA10 Priority	<u>Relative</u> Priority for Conservation	Site Occupation and Reproduction Status	**Habitat Conditions** (above both thresholds; OR below 1 or both thresholds)
1	Highest	KS with Reproductive Pair or Any Unsurveyed[1] Known Site	>= 50% CA & >= 40% PHR
2		KS with Reproductive Pair or Unsurveyed Known Site with Reproductive Pair	< 50% CA **&/or** < 40% PHR
3		KS with Pair	>= 50% CA & >= 40% PHR
4		KS with Pair or Unsurveyed Known Site with Pair	< 50% CA **&/or** < 40% PHR
5		KS with Single	>= 50% CA & >= 40% PHR
6		KS with Single or Unsurveyed Known Site with Single	< 50% CA **&/or** < 40% PHR
7		Any Unsurveyed PS[2]	Any[2]
8		KS/PS Unoccupied	>= 50% CA & >= 40% PHR
9		KS/PS Unoccupied	< 50% CA **&/or** < 40% PHR
10	Lowest	TS	Any

Abbreviations & Definitions (see Table F-2 for full terminology definitions)

RA10	Recovery Action 10 of the Revised Northern Spotted Owl Recovery Plan (2011).
KS	Known Site, including historic sites (any definition).
PS	Potential Site
TS	Temporary Site (See term definitions in separate table. A site with spotted owl detections that does not warrant establishment of a known site).
CA	Core Area of 0.5 mile
PHR	Provincial Home Range(or Home Range) of 1.2 mile
RA10 Priority	Recovery Action 10 Spotted Owl Site Relative Priority

[1]Unsurveyed Sites means Territories with less than 5 protocol Survey Years in the last 10 calendar year period. "Unsurveyed" conditions could arise from various combinations of sites with zero surveys or incomplete non-protocol surveys without owl detections (i.e., no valid Survey Years).

[2]A Potential Site as defined in Appendix E of this BA. Based on local field unit knowledge, potential sites may have habitat slightly below 50/40% thresholds in the core area and provincial home range respectively and still provide for spotted owl pair occupation. When habitat amounts are below amounts to provide for pair occupation, the concept of a potential site is no longer valid because it would not provide for spotted owl pair occupation. If spotted owls are detected in a potential site, the site immediately becomes a temporary or known site for the purposes of RA10 prioritization.

Table H- 2. Terminology and Concepts used in Recovery Action 10 prioritization in this BA.

Term	Definition
Core Area	Area defined by a 0.5 mile radius around a site center.
Habitat Conditions	For RA10 Priority, habitats were categorized as one of two conditions: 1) Habitat equal to, or above, both of the 50/40% thresholds in the core area and provincial home range respectively; or 2) Habitat below one or both of these thresholds at the same scales.
Historic Status Process (for RA10 Prioritization)	RA10 Prioritization process used when there were less than 5 valid Survey Years within the last 10 calendar years, and no spotted owls were detected. This includes scenarios without a sufficient number and arrangement of surveys to determine a site to be "Unoccupied". RA10 Priority outcomes using this process were either 1) The highest Yearly Status since 1990 was used to determine RA10 Priority when habitat is below one or both of the 50/40% thresholds in the core area and provincial home range respectively; OR 2) the site was assumed to be occupied by a reproductive pair when habitat is above both of the 50/40% thresholds in the core area and provincial home range respectively.
Known Site	A site with a permanent state-issued Master Site Number (or other identifier), including "historic sites" (any definition).
No-Survey Year	Any year (1) without surveys, or (2) Where no owls were detected, but only partial or incomplete surveys were done with regard to protocol methods for amount, timing, and area covered.
Occupation and Reproduction Status	Yearly Site Status indicating whether a site had a Single spotted owl, a spotted owl Pair, was Unoccupied (valid protocol methods and no owls detected), or status was Unknown (no owls detected, but valid protocol method amounts or coverage not implemented).
Pair	A Yearly Site Status outcome when surveys (or other information) indicated a spotted owl pair was present (at least one time) and non-nesting in a given year (or nest status was unknown). A RA10 Priority that included a spotted owl Pair was assigned when a pair was present at a site at least 1 time in the previous 5 Survey Years during that last 10 year period (with no indication of a nest attempt); or as a result of using the Historic Status Process.
Potential Site	A Potential Site as defined in Appendix E of this BA. Based on local field unit knowledge, Potential sites may have habitat slightly below 50/40% thresholds in the core area and home range and still provide for spotted owl pair occupation. When habitat amounts are below amounts to provide for pair occupation, the concept of a Potential Site is no longer valid. If spotted owls are detected in a Potential Site, the site immediately becomes a Temporary or Known Site for the purposes of RA10 evaluation.
Process (for RA10 Prioritization)	RA10 Prioritization process used when ample valid Survey Years (amount or results) occurred in the last 10 calendar years, including a sufficient number of protocol surveys to determine a site to be "Unoccupied". The highest Yearly Status from recent surveys was used to determine RA10 Priority.
Protocol Visit(s)	Survey (or monitoring) visit regime for a site with the appropriate amount, timing and spacing of visits for a year based on accepted survey protocols. This appendix is based on the 6-visit protocol methodology found in the USFWS protocol. With approval of the USFWS, other survey/monitoring protocols that require fewer visits may be used (e.g., Demography Study Area protocols for sites therein may require only 3 visits).
Provincial Home Range (or Home Range)	Area defined by a 1.2 mile radius around a site center.
RA10 Priority	A prioritization of spotted owl sites following direction established by Recovery Action 10. The higher the priority (lower the number) the more the site is expected to contribute to spotted owl demographic support. Priority was based on various combinations of Yearly Site Status or Historic Status, and habitat conditions.

Term	Definition
Reproductive Pair	A Yearly Site Status outcome when surveys (or other information) indicated a spotted owl pair attempted to nest at a site in a given year. Status options for reproduction were "nesting" or "unknown" (non-nesting was used when methods are in accord with protocols methods that specify how to "confirm'' non-nesting). A RA10 Priority that included a spotted owl Reproductive Pair was assigned when a nesting pair was present at a site at least 1 time in the previous 5 Survey Years during the last 10 year period; or as a result of using the Historic Status Process.
Single	A Yearly Site Status outcome when surveys (or other information) indicated a spotted owl single individual was present (at least one time) and not paired in a given year. A RA10 Priority that included a spotted owl Single was assigned when a single individual was present at a site at least 1 time in the previous 5 Survey Years during that last 10 year period (with no indication of pair presence); or as a result of using the Historic Status Process.
Survey Year	Any year where: (1) a survey protocol was implemented to determine a site to be Unoccupied; or (2) Surveys (or other information) indicating a positive occupation and/or nesting status (i.e., owls were detected). Note that occupation and reproductive status can be confirmed in fewer than 6 survey visits.
Temporary Site	An area where spotted owls have been detected, but the number and/or timing of detections over 1 or more years does not warrant establishment of a Known Site. If spotted owls are detected for the first time in an area (or the first time after many years of no detections/surveys), Temporary Sites are usually treated as Known Sites until the site status is determined (often within the following year).
Unknown	A Yearly Site Status of "Unknown" occurred when a site was not surveyed in a given year; or surveys were not consistent with protocol methods (for method, amount, timing and spacing) and no owls were detected. When owls were not detected in the last 5 Survey Years and the site status was unknown (based on a lack of surveys and/or protocol status determinations within the last 10 calendar years), one of the 2 Historic Site Processes was used to determine the RA10 Priority. NOTE: When non-protocol surveys indicated owl presence at a site, but did not fully determine occupation or reproduction status; the local field unit biologists decided how to use this information to assess the Yearly Site Status and/or RA10 Priority.
Unoccupied	A Yearly Site Status of Unoccupied was determined during a valid Survey (using Protocol visits for area covered, amount, timing and spacing of visits) that resulted in no owl detections. A RA 10 Priority that included a status of Unoccupied was assigned when there were at least 5 valid Survey Years in the last 10 calendar years, including 3 consecutive previous calendar years, all with a Yearly Site Status of Unoccupied.
Yearly Site Status	Annual site status based on survey results (or lack thereof) and a combination of Occupation and Reproduction status.

APPENDIX G: Climate Change

General Overview

Global climate change is arguably the most pressing environmental issue of our time, and there is growing evidence that recent climate change has impacted a wide range of ecological systems (Ådahl *et al*. 2006; Stenseth *et al*. 2002; Walther *et al*. 2002; IPCC 2014). Climate change, combined with effects from past management practices, is exacerbating changes in forest ecosystem processes and dynamics to a greater degree than originally anticipated under the NWFP. Environmental variation affects all wildlife populations; however, climate change presents new challenges as systems may change beyond historical ranges of variability. In some areas, changes in weather and climate may result in major shifts in vegetation communities that can persist in particular regions.

With concern growing among scientists about the effects of human-caused climate change on ecological systems, an ever-increasing number of studies are demonstrating effects of climate and weather on the demography of numerous species (Jenouvrier *et al*. 2003, Rodríguez and Bustamante 2003, Glenn *et al*. 2010, McKelvey *et al*. 2013, Dugger *et al*. 2016). To develop sound conservation plans for at-risk species, it is essential to understand the processes driving population regulation and to identify factors that cause population fluctuations (White 2000). Although habitat loss and degradation are often the most significant factors influencing species declines and extinctions (Doak 1995), abiotic factors such as weather and climate can also be important, particularly for small populations (Boyce 1992).

Climate, which is the long-term average of weather, affects the distribution and abundance of species throughout the world (Ontiveros and Pleguezuelos 2003) and has been linked to large-scale patterns in demographic variability (Ådahl *et al*. 2006). In many areas, weather conditions vary widely by season as well as on an annual basis. In addition, climate and weather vary spatially, and effects can be strong at extremes of species' ranges or for small, isolated populations that are at greater risk of extinction from catastrophic events (Lande 1993). Population processes are affected by both large-scale fluctuations in climate conditions and by local weather variation.

In the past 100 years, the Earth's climate has warmed by approximately 0.6˚ C (Walther *et al*. 2002), and both temperature and precipitation are predicted to increase in many areas of the world as the concentration of greenhouse gases continues to rise (IPCC 2014). On a regional scale the effects of global climate change can be quite variable, with temperature and precipitation increasing in some areas and decreasing in others. In general, climatologists predict that there will be an increase in variability and occurrence of extreme weather events. Climate change has been shown to have consequences on the phenology and physiology of organisms (Forchhammer *et al*. 1999, Creswell and McCleary 2003), range and distribution of species (Inkley at al. 2004,Burns *et al*. 2003, Copeland *et al*. 2010, McKelvey *et al*. 2010), composition of and interaction within communities, and the structure and dynamics of ecosystems (Walther *et al*. 2002). Long-term studies have documented earlier arrival of migratory birds (Sparks 1999), earlier reproduction of amphibians (Forchhammer *et al*. 1998) and birds (Sanz 2002), and earlier eruption of leaf buds (Sparks and Yates 1997). In addition to specific physiological requirements of individual species, the driving forces in these shifts are believed to be changes in temperature and precipitation (Inkley *et al*. 2004). Other responses to climate change included changes in the degree of primary and secondary sexual characteristics (Möller 2004), changes in the competitive interactions among species (Ahola *et al*. 2007), and phenological disjunction where a species' behavior becomes out of synchrony with its environment (Crick 2004). Although many factors influence population dynamics, certain species may be particularly susceptible to population declines from variation in weather conditions (Walther *et al*. 2002, Beever *et al*. 2010).

As noted by the BLM in their EIS for the PRMP (BLM 2016), stream temperatures in the Pacific Northwest and across North America have been increasing (Bartholow 2005, Kaushal *et al*. 2010, Dalton *et al*. 2013). Climate modeling indicates that by the mid-21st century, peak flows from snowmelt would occur 3–4 weeks earlier in the Pacific Northwest as compared to the current timing (Dalton *et al*. 2013 and references therein). All streams in western Oregon would be rain-dominant by the end of the century (Dalton *et al*. 2013 and references therein, Figure 3.2; Klos *et al*. 2014). Rain-dominant streams tend to experience peak flows earlier than snow-dominant systems; therefore, some streams originating in the Cascades would experience earlier peak flows and reduced spring and summer flows (Dalton *et al*. 2013). If winter precipitation increases as projected, peak flows would increase in magnitude, but timing would otherwise not change in systems that are already rain-dominated (Dalton *et al*. 2013). Mean annual streamflow could initially decrease by the 2020s and then increase through the end of the century by 0.6 to 5.5 percent, apparently driven by projected increases in winter precipitation (Wu *et al*. 2012). Mean summer streamflow is expected to continually decrease to approximately 30 percent less than current levels by the end of the century (Wu *et al*. 2012).

Global climate change has the potential to produce entirely new environmental conditions, making predictions about future ecological consequences a more daunting challenge. Recent forecasts (Mote *et al*. 2008) indicate that climate change will have long-term and variable impacts on forest habitat at local and regional scales. Locally, this could involve shifts in tree species composition that influence habitat suitability. Regionally, there could be losses of habitat availability caused by advances or retreats of entire vegetative communities, and perhaps prey communities as well. Effects of climate change, including fire and pest incidence, will not only affect currently suitable habitat for the northern spotted owl, they will also likely alter or interrupt forest growth and development processes that influence forest turnover rates and the emergence of suitable habitat attributes in new locations. These changes are predicted to be driven by changes in patterns of temperature and precipitation that are projected to occur under climate change scenarios (Mote *et al*. 2008).

Temperature and Precipitation

In the Pacific Northwest, mean annual temperatures rose 0.8˚ C (1.5˚F) in the 20th century and are expected to continue to warm from 0.1˚ to 0.6 ˚C (0.2 ˚ to 1 ˚ F) per decade (Mote and Salathe 2010, p. 29). Global climate models project an increase of 1 to 2 percent in annual average precipitation, with some predicting wetter autumns and winters with drier summers (Mote and Salathe 2010, p. 29). University of Washington researchers (Salathe *et al*. 2009) have developed finer-resolution regional, predictive climate models that account for local terrain and other factors that affect weather (*e.g.*, snow cover, cloudiness, soil moisture, and circulation patterns) in the Pacific Northwest. Throughout the range of the northern spotted owl, predicted increases in mean annual temperature range from 0.6 to 2.4 ˚C (33.0 to 37.4 ˚F) by the year 2050 (Figure 3.7 in U.S. Climate Change Science Program 2008). Mean monthly maximum temperatures are predicted to rise by 3.0 to 4.5 ˚C (37.0 to 40.04˚F) by 2099 (Figure 1 in Lenihan *et al*. 2008b). These models agree with the global climate models in projecting warmer, drier summers and warmer, wetter autumns and winters for much of the Pacific Northwest, which will likely result in diminished snowpack, earlier snowmelt, and an increase in extreme heat waves and precipitation events.

On the cooler, moister west side of the Cascades, the summer water deficit is projected to increase two- to three-fold over current conditions (Littell 2009). East of the Cascade Crest, summer water deficits may increase to a lesser extent (Elsner *et al*. 2009). Researchers expect some ecosystems to become more water-limited, more sensitive to variability in temperature, and more prone to disturbance (McKenzie *et al*. 2009). There is evidence that the productivity of many high-elevation forests, where low summer temperature and winter snowpack limits the length of the growing season, is increasing in the Pacific Northwest as temperatures rise, potentially increasing the elevation of the tree line (Graumlich *et al*. 1989,entire; Case and Peterson 2009). Conversely, productivity and tree growth in many low-elevation Pacific Northwest forests is likely to decrease due to the longer, warmer summers (Case and Peterson 2009). This may result in a change in species composition or reduction in the acreage of existing low-elevation forests.

Seasonality of precipitation may be strongly affected by climate change (Cayan *et al*., 2005). In the next century, winter precipitation across the entire range of the northern spotted owl is forecast to increase by 5 to 15 percent above the amounts for the 1958 through 2008 reference period, with the greatest increases in the Cascade Ranges and Olympic Peninsula. Summer precipitation is predicted to decrease by 10 to 35 percent over the same period, with the greatest change rates also in the Cascades and Olympic Peninsula. Forecasts of spring and fall precipitation show a mixed outcome, with decreases of 5 to 20 percent throughout northern California, and increases of 0 to 15 percent over the remainder of the species' range (Karl *et al*., 2009 p. 31).

Forest Composition

Climate change forecasts indicate significant effects on the tree species composition of western forests over the next century, with long term implications for the composition and structure of northern spotted owl habitat. The general predicted trend in North American forests is declining occupancy by conifers and displacement by hardwoods (Karl *et al*. 2009). In interior northwestern California, conifer-dominated forests are expected to decline sharply by 40 to 60 percent by 2100, with proportional increases in mixed forests with hardwoods as sub-dominant or dominant species (Lenihan *et al*. 2008). Lenihan *et al*. (2008) also predict a pattern of hardwoods displacing conifers in coastal and interior-coastal areas within the species' range; but they point out that an important predictor of future outcomes is continued public support for fire suppression programs. In simulations without fire suppression they found the same effect in coastal areas, but additionally found displacement of conifer forest by advancing woodland and savannah in the eastern Cascade Ranges.

Disturbance Patterns

Climate change is affecting the location, size and intensity of insect outbreaks, which in turn affect fire (frequency, intensity, and extent) and other forest processes (Joyce *et al*. 2008; Littell *et al*. 2009; Latta *et al*. 2010; Spies *et al*. 2010). Warming temperatures have led to mountain pine beetle (*Dendroctonus ponerosae*) outbreaks, with large-scale effects in some western forests, including in the eastern Cascades. In warmer winters more mountain pine beetles survive, which shortens their generation time, resulting in larger and more severe outbreaks. Drought can heighten the susceptibility of host trees to attack (Littell *et al*. 2010).

Stand-replacing events and disturbances have also been predicted to speed up ecological conversions (*e.g*., forests to shrublands) (Joyce *et al*. 2008; Blate *et al*. 2009). Dry forests are at greater risk to large scale disturbances (Agee and Skinner 2005; Mitchell *et al*. 2009), but recent research suggests large-scale disturbances will become more likely in west-side forests that have not traditionally been thought of as fire prone (Littell *et al*. 2010).

Summary

As noted above, numerous studies have documented changes in species distribution, movement, and demography associated with changing climatic conditions. In addition, changes in forest composition and structure as well as ecosystem structure and function resulting from climate change may impact availability of habitat for a range of species.

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7. **U.S. Forest Service Special Use Permit BAR166.**

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SPECIAL USE PERMIT
Authority: FEDERAL LAND POLICY AND MGMT ACT, AS AMENDED October 21, 1976

CITY OF THE DALLES, of 313 COURT STREET, THE DALLES, OR 97058 UNITED STATES (hereinafter "the holder") is authorized to use or occupy National Forest System lands in the MT HOOD NATIONAL FOREST, Barlow Ranger District unit of the National Forest System, subject to the terms and conditions of this special use permit (the permit).

This permit covers approximately 4.73 acres or 3.9 miles in the Sec. 34, T. 1 S., R. 10 E., WILLAMETTE MERIDIAN, Sec. 10, T. 2 S., R. 10 E., WILLAMETTE MERIDIAN, Sec. 11, T. 2 S., R. 10 E., WILLAMETTE MERIDIAN, Sec. 4, T. 2 S., R. 10 E., WILLAMETTE MERIDIAN, Sec. 9, T. 2 S., R. 10 E., WILLAMETTE MERIDIAN, Sec. 2, T. 2 S., R. 10 E., WILLAMETTE MERIDIAN, Sec. 3, T. 2 S., R. 10 E., WILLAMETTE MERIDIAN , ("the permit area"), as shown on the map attachedas Appendix A. This and any other appendices to this permit are hereby incorporated into this permit.

This permit issued for the purpose of:

Ownership, operation, and maintenance of water pipeline (known as the "Dog River Pipeline") for the purpose of diverting water from the Dog River system into the South Fork of Mill Creek supplementing the City of The Dalles municipal water supply.

The holder will provide 0.5 cubic feet per second (cfs) bypass flow below the point of diversion during August, September, and October.

Appendix A- Maps
Appendix B- Operations and Maintenance Plan

TERMS AND CONDITIONS

I. GENERAL TERMS

A. AUTHORITY. This permit is issued pursuant to the FEDERAL LAND POLICY AND MGMT ACT, AS AMENDED, October 21, 1976 and 36 CFR Part 251, Subpart B, as amended, and is subject to their provisions.

B. AUTHORIZED OFFICER. The authorized officer is the Forest or Grassland Supervisor or a subordinate officer with delegated authority.

C. TERM. This permit shall expire at midnight on 12/31/2050, 30 years from the date of issuance.

D. CONTINUATION OF USE AND OCCUPANCY. This permit is not renewable. Prior to expiration of this permit, the holder may apply for a new permit for the use and occupancy authorized by this permit. Applications for a new permit must be submitted at least 6 months prior to expiration of this permit. Issuance of a new permit is at the sole discretion of the authorized officer. At a minimum, before issuing a new permit, the authorized officer shall ensure that (1) the use and occupancy to be authorized by the new permit is consistent with the standards and guidelines in the applicable land management plan; (2) the type of use and occupancy to be authorized by the new permit is the same as the type of use and occupancy authorized by this permit; and (3) the holder is incompliance with all the terms of this permit. The authorized officer may prescribe new terms and conditions when a new permit is issued.

E. AMENDMENT. This permit may be amended in whole or in part by the Forest Service when, atthe discretion of the authorized officer, such action is deemed necessary or desirable to incorporate new terms that may be required by law, regulation, directive, the applicable forest land and resourcemanagement plan, or projects and activities implementing a land management plan pursuant to 36 CFR Part 215.

F. COMPLIANCE WITH LAWS, REGULATIONS, AND OTHER LEGAL REQUIREMENTS. In exercising the rights and privileges granted by this permit, the holder shall comply with all present and future federal laws and regulations and all present and future state, county, and municipal laws, regulations, and other legal requirements that apply to the permit area, to the extent they do not conflict with federal law, regulation, or policy. The Forest Service assumesno responsibility for enforcing laws, regulations, and other legal requirements that fall under the jurisdiction of other governmental entities.

G. NON-EXCLUSIVE USE. The use or occupancy authorized by this permit is not exclusive. The Forest Service reserves the right of access to the permit area, including a continuing right of physicalentry to the permit area for inspection, monitoring, or any other purpose consistent with any right or obligation of the United States under any law or regulation. The Forest Service reserves the right to allow others to use the permit area in any way that is not inconsistent with the holder's rights and privileges under this permit, after consultation with all parties involved. Except for any restrictions that the holder and the authorized officer agree are necessary to protect the installation and operationof authorized temporary improvements, the lands and waters covered by this permit shall remain open to the public for all lawful purposes.

H. ASSIGNABILITY. This permit is not assignable or transferable.

I. TRANSFER OF TITLE TO THE IMPROVEMENTS.

1. Notification of Transfer. The holder shall notify the authorized officer when a transfer of title to allor part of the authorized improvements is planned.

2. Transfer of Title. Any transfer of title to the improvements covered by this permit shall result intermination of the permit. The party who acquires title to the improvements must submit an application for a permit. The Forest Service is not obligated to issue a new permit to the party whoacquires title to the improvements. The authorized officer shall determine that the applicant meetsrequirements under applicable federal regulations.

J. **CHANGE IN CONTROL OF THE BUSINESS ENTITY.**

1. Notification of Change in Control. The holder shall notify the authorized officer when a change incontrol of the business entity that holds this permit is contemplated.

(a). In the case of a corporation, control is an interest, beneficial or otherwise, of sufficient outstanding voting securities or capital of the business so as to permit the exercise of managerial authority over the actions and operations of the corporation or election of a majority of the board ofdirectors of the corporation.

(b). In the case of a partnership, limited partnership, joint venture, or individual entrepreneurship, control is a beneficial ownership of or interest in the entity or its capital so as to permit the exerciseof managerial authority over the actions and operations of the entity.

(c). In other circumstances, control is any arrangement under which a third party has the ability toexercise management authority over the actions or operations of the business.

2. Effect of Change in Control. Any change in control of the business entity as defined in paragraph1 of this clause shall result in termination of this permit. The party acquiring control must submit anapplication for a special use permit. The Forest Service is not obligated to issue a new permit to the party who acquires control. The authorized officer shall determine whether the applicant meets the requirements established by applicable federal regulations.

II. **IMPROVEMENTS**

A. LIMITATIONS ON USE. Nothing in this permit gives or implies permission to build or maintain any structure or facility or to conduct any activity, unless specifically authorized by this permit. Any use not specifically authorized by this permit must be proposed in accordance with 36 CFR 251.54. Approval of such a proposal through issuance of a new permit or permit amendment isat the sole discretion of the authorized officer.

B. PLANS. All plans for development, layout, construction, reconstruction, or alteration of improvements in the permit area, as well as revisions to those plans must be prepared by a professional engineer, architect, landscape architect, or other qualified professional based on federal employment standards acceptable to the authorized officer. These plans and plan revisions must havewritten approval from the authorized officer before they are implemented. The authorized officer may require the holder to furnish as-built plans, maps, or surveys upon completion of the work.

C. **CONSTRUCTION**. Any construction authorized by this permit shall commence by n/a and shallbe completed by n/a.

III. **OPERATIONS**.

A. **PERIOD OF USE**. Use or occupancy of the permit area shall be exercised at least 365 days eachyear.

B. **CONDITION OF OPERATIONS**. The holder shall maintain the authorized improvements andpermit area to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the authorized officer and consistent with other provisions of this permit. Standards are subject to periodic change by the authorized officer when deemed necessary to meet statutory, regulatory, or policy requirements or to protect national forest resources. The holder shall comply with inspectionrequirements deemed appropriate by the authorized officer.

C. **OPERATING PLAN**. The holder shall prepare and annually revise by January 1 an operating plan. The operating plan shall be prepared in consultation with the authorized officer or the authorized officer's designated representative and shall cover all operations authorized by this permit.The operating plan shall outline steps the holder will take to protect public health and safety and the environment and shall include sufficient detail and standards to enable the Forest Service to monitor the holder's operations for compliance with the terms and conditions of this permit. The operating plan shall be submitted by the holder and approved by the authorized officer or the authorized officer's designated representative prior to commencement of operations and shall be attached to this permit as an appendix. The authorized officer may require an annual meeting with the holder to discuss the terms and conditions of the permit or operating plan, annual use reports, or other concerns either party may have.

D. **MONITORING BY THE FOREST SERVICE**. The Forest Service shall monitor the holder's operations and reserves the right to inspect the permit area and transmission facilities at any time for compliance with the terms of this permit. The holder shall comply with inspection requirements deemed appropriate by the authorized officer. The holder's obligations under this permit are not contingent upon any duty of the Forest Service to inspect the permit area or transmission facilities. Afailure by the Forest Service or other governmental officials to inspect is not a justification for noncompliance with any of the terms and conditions of this permit.

IV. **RIGHTS AND LIABILITIES**

A. **LEGAL EFFECT OF THE PERMIT**. This permit, which is revocable and terminable, is not a contract or a lease, but rather a federal license. The benefits and requirements conferred by this authorization are reviewable solely under the procedures set forth in 36 CFR 214 and 5 U.S.C. 704. This permit does not constitute a contract for purposes of the Contract Disputes Act, 41 U.S.C. 601. The permit is not real property, does not convey any interest in real property, and may not be used ascollateral for a loan.

B. **VALID EXISTING RIGHTS**. This permit is subject to all valid existing rights. Valid existing rights include those derived under mining and mineral leasing laws of the United States. The UnitedStates is not liable to the holder for the exercise of any such right.

C. **ABSENCE OF THIRD-PARTY BENEFICIARY RIGHTS**. The parties to this permit do notintend to confer any rights on any third party as a beneficiary under this permit.

D. **SERVICES NOT PROVIDED**. This permit does not provide for the furnishing of road or trailmaintenance, water, fire protection, search and rescue, or any other such service by a government agency, utility, association, or individual.

E. **RISK OF LOSS**. The holder assumes all risk of loss associated with use or occupancy of the permit area, including but not limited to theft, vandalism, fire and any fire-fighting activities (including prescribed burns), avalanches, rising waters, winds, falling limbs or trees, and other forcesof nature. If authorized temporary improvements in the permit area are destroyed or substantially damaged, the authorized officer shall conduct an analysis to determine whether the improvements can be safely occupied in the future and whether rebuilding should be allowed. If rebuilding is not allowed, the permit shall terminate.

F. **DAMAGE TO UNITED STATES PROPERTY**. The holder has an affirmative duty to protect from damage the land, property, and other interests of the United States. Damage includes but is notlimited to fire suppression costs and damage to government-owned improvements covered by this permit.

1. The holder shall be liable for all injury, loss, or damage, including fire suppression, prevention andcontrol of the spread of invasive species, or other costs in connection with rehabilitation or restoration of natural resources resulting from the use or occupancy authorized by this permit. Compensation shall include but not be limited to the value of resources damaged or destroyed, the costs of restoration, cleanup, or other mitigation, fire suppression or other types of abatement costs, and all administrative, legal (including attorney's fees), and other costs. Such costs may be deducted from a performance bond required under clause IV.J.

2. The holder shall be liable for damage caused by use of the holder or the holder's heirs, assigns, agents, employees, contractors, or lessees to all roads and trails of the United States to the same extent as provided under clause IV.F.1, except that liability shall not include reasonable and ordinarywear and tear.

G. **HEALTH AND SAFETY**. The holder shall take all measures necessary to protect the health andsafety of all persons affected by the use and occupancy authorized by this permit. The holder shall promptly abate as completely as possible and in compliance with all applicable laws and regulations any physical or mechanical procedure, activity, event, or condition existing or occurring in connection with the authorized use and occupancy during the term of this permit that causes or threatens to cause a hazard to the health or safety of the public or the holder's employees or agents. The holder shall as soon as practicable notify the authorized officer of all serious accidents that occurin connection with these procedures, activities, events, or conditions. The Forest Service has no duty under the terms of this permit to inspect the permit area or operations of the holder for hazardous conditions or compliance with health and safety standards.

H. ENVIRONMENTAL PROTECTION.

1. For purposes of clause IV.H and section V, "hazardous material" shall mean (a) any hazardous substance under section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601(14); (b) any pollutant or contaminant under section 101(33) of CERCLA, 42 U.S.C. 9601(33); (c) any petroleum product or its derivative, including fueloil, and waste oils; and (d) any hazardous substance, extremely hazardous substance, toxic substance,hazardous waste, ignitable, reactive or corrosive materials, pollutant, contaminant, element, compound, mixture, solution or substance that may pose a present or potential hazard to human health or the environment under any applicable environmental laws.

2. The holder shall avoid damaging or contaminating the environment, including but not limited to the soil, vegetation (such as trees, shrubs, and grass), surface water, and groundwater, during the holder's use and occupancy of the permit area. Environmental damage includes but is not limited to all costs and damages associated with or resulting from the release or threatened release of a hazardous material occurring during or as a result of activities of the holder or the holder's heirs, assigns, agents, employees, contractors, or lessees on, or related to, the lands, property, and other interests covered by this permit. If the environment or any government property covered by this permit becomes damaged in connection with the holder's use and occupancy, the holder shall as soonas practicable repair the damage or replace the damaged items to the satisfaction of the authorized officer and at no expense to the United States.

3. The holder shall as soon as practicable, as completely as possible, and in compliance with all applicable laws and regulations abate any physical or mechanical procedure, activity, event, or condition existing or occurring in connection with the authorized use and occupancy during or after the term of this permit that causes or threatens to cause harm to the environment, including areas of vegetation or timber, fish or other wildlife populations, their habitats, or any other natural resources.

I. INDEMNIFICATION OF THE UNITED STATES. The holder shall indemnify, defend, and hold harmless the United States for any costs, damages, claims, liabilities, and judgments arising from past, present, and future acts or omissions of the holder in connection with the use or occupancy authorized by this permit. This indemnification provision includes but is not limited to acts and omissions of the holder or the holder's heirs, assigns, agents, employees, contractors, or lessees in connection with the use or occupancy authorized by this permit which result in (1) violations of any laws and regulations which are now or which may in the future become applicable; (2) judgments, claims, demands, penalties, or fees assessed against the United States; (3) costs, expenses, and damages incurred by the United States; or (4) the release or threatened release of anysolid waste, hazardous waste, hazardous materials, pollutant, contaminant, oil in any form, or petroleum product into the environment. The authorized officer may prescribe terms that allow the holder to replace, repair, restore, or otherwise undertake necessary curative actions to mitigate damages in addition to or as an alternative to monetary indemnification.

J. BONDING. The authorized officer may require the holder to furnish a surety bond or othersecurity for any of the obligations imposed by the terms and conditions of this permit or any applicable law, regulation, or order.

V. RESOURCE PROTECTION

A. COMPLIANCE WITH ENVIRONMENTAL LAWS. The holder shall in connection with theuse or occupancy authorized by this permit comply with all applicable federal, state, and local environmental laws and regulations, including but not limited to those established pursuant to theResource Conservation and Recovery Act, as amended, 42 U.S.C. 6901 et seq., the Federal WaterPollution Control Act, as amended, 33 U.S.C. 1251 et seq., the Oil Pollution Act, as amended, 33
U.S.C. 2701 et seq., the Clean Air Act, as amended, 42 U.S.C. 7401 et seq., CERCLA, as amended,42 U.S.C. 9601 et seq., the Toxic Substances Control Act, as amended, 15 U.S.C. 2601 et seq., the Federal Insecticide, Fungicide, and Rodenticide Act, as amended, 7 U.S.C. 136 et seq., and the SafeDrinking Water Act, as amended, 42 U.S.C. 300f et seq.

B. VANDALISM. The holder shall take reasonable measures to prevent and discourage vandalismand disorderly conduct and when necessary shall contact the appropriate law enforcement officer.

C. PESTICIDE USE.

1. Authorized Officer Concurrence. Pesticides may not be used outside of buildings in the permit area to control pests, including undesirable woody and herbaceous vegetation (including aquatic plants), insects, birds, rodents, or fish without prior written concurrence of the authorized officer. Only those products registered or otherwise authorized by the U.S. Environmental Protection Agencyand appropriate State authority for the specific purpose planned shall be authorized for use within areas on National Forest System lands.

2. Pesticide-Use Proposal. Requests for concurrence of any planned uses of pesticides shall be provided in advance using the Pesticide-Use Proposal (form FS-2100-2). Annually the holder shall,on the due date established by the authorized officer, submit requests for any new, or continued, pesticide usage. The Pesticide-Use Proposal shall cover a 12-month period of planned use. The Pesticide-Use Proposal shall be submitted at least 60 days in advance of pesticide application. Information essential for review shall be provided in the form specified. Exceptions to this schedulemay be allowed, subject to emergency request and approval, only when unexpected outbreaks of pests require control measures which were not anticipated at the time a Pesticide-Use Proposal was submitted.

3. Labeling, Laws, and Regulations. Label instructions and all applicable laws and regulations shallbe strictly followed in the application of pesticides and disposal of excess materials and containers.No pesticide waste, excess materials, or containers shall be disposed of in any area administered bythe Forest Service.

D. ARCHAEOLOGICAL-PALEONTOLOGICAL DISCOVERIES. The holder shall immediately notify the authorized officer of all antiquities or other objects of historic or scientific interest, including but not limited to historic or prehistoric ruins, fossils, or artifacts discovered in connection with the use and occupancy authorized by this permit. The holder shall follow the applicable inadvertent discovery protocols for the undertaking provided in an agreement executed pursuant to section 106 of the National Historic Preservation Act, 54 U.S.C. 306108; if there are nosuch agreed-upon protocols, the holder shall leave these discoveries intact and in place until consultation has occurred, as informed, if applicable, by any programmatic agreement with tribes. Protective and mitigation measures developed under this clause shall be the responsibility of the holder. However, the holder shall give the authorized officer written notice before implementing these measures and shall coordinate with the authorized officer for proximate and contextual discoveries extending beyond the permit area.

E. NATIVE AMERICAN GRAVES PROTECTION AND REPATRIATION ACT (NAGPRA).In accordance with 25 U.S.C. 3002(d) and 43 CFR 10.4, if the holder inadvertently discovers human remains, funerary objects, sacred objects, or objects of cultural patrimony on National Forest System lands, the holder shall immediately cease work in the area of the discovery and shall make a reasonable effort to protect and secure the items. The holder shall follow the applicable NAGPRA protocols for the undertaking provided in the NAGPRA plan of action or the NAGPRA comprehensive agreement; if there are no such agreed-upon protocols, the holder shall as soon as practicable notify the authorized officer of the discovery and shall follow up with written confirmation of the discovery. The activity that resulted in the inadvertent discovery may not resumeuntil 30 days after the forest archaeologist certifies receipt of the written confirmation, if resumption of the activity is otherwise lawful, or at any time if a binding written agreement has been executed between the Forest Service and the affiliated Indian tribes that adopts a recovery plan for the human remains and objects.

F. PROTECTION OF THREATENED AND ENDANGERED SPECIES, SENSITIVE SPECIES, AND SPECIES OF CONSERVATION CONCERN AND THEIR HABITAT.

1. Threatened and Endangered Species and Their Habitat. The location of sites within the permit areaneeding special measures for protection of plants or animals listed as threatened or endangered underthe Endangered Species Act (ESA) of 1973, 16 U.S.C. 1531 et seq., as amended, or within designated critical habitat shall be shown on a map in an appendix to this permit and may be shown on the ground. The holder shall take any protective and mitigation measures specified by the authorized officer as necessary and appropriate to avoid or reduce effects on listed species or designated critical habitat affected by the authorized use and occupancy. Discovery by the holder or the Forest Service of other sites within the permit area containing threatened or endangered species or designated critical habitat not shown on the map in the appendix shall be promptly reported to the other party and shall be added to the map.

2. Sensitive Species and Species of Conservation Concern and Their Habitat. The location of sites within the permit area needing special measures for protection of plants or animals designated by theRegional Forester as sensitive species or as species of conservation concern pursuant to FSM 2670 shall be shown on a map in an appendix to this permit and may be shown on the ground. The holder shall take any protective and mitigation measures specified by the authorized officer as necessary and appropriate to avoid or reduce effects on sensitive species or species of conservation concern or their habitat affected by the authorized use and occupancy. Discovery by the holder or the Forest Service of other sites within the permit area containing sensitive species or species of conservation concern or their habitat not shown on the map in the appendix shall be promptly reported to the otherparty and shall be added to the map.

G. **CONSENT TO STORE HAZARDOUS MATERIALS**. The holder shall not store any hazardous materials at the site without prior written approval from the authorized officer. This approval shall not be unreasonably withheld. If the authorized officer provides approval, this permitshall include, or in the case of approval provided after this permit is issued, shall be amended to include specific terms addressing the storage of hazardous materials, including the specific type of materials to be stored, the volume, the type of storage, and a spill plan. Such terms shall be proposedby the holder and are subject to approval by the authorized officer.

H. CLEANUP AND REMEDIATION.

1. The holder shall immediately notify all appropriate response authorities, including the National Response Center and the authorized officer or the authorized officer's designated representative, of any oil discharge or of the release of a hazardous material in the permit area in an amount greater than or equal to its reportable quantity, in accordance with 33 CFR Part 153, Subpart B, and 40 CFRPart 302. For the purposes of this requirement, "oil" is as defined by section 311(a)(1) of the Clean Water Act, 33 U.S.C. 1321(a)(1). The holder shall immediately notify the authorized officer or the authorized officer's designated representative of any release or threatened release of any hazardous material in or near the permit area which may be harmful to public health or welfare or which may adversely affect natural resources on federal lands.

2. Except with respect to any federally permitted release as that term is defined under Section 101(10) of CERCLA, 42 U.S.C. 9601(10), the holder shall clean up or otherwise remediate any release, threat of release, or discharge of hazardous materials that occurs either in the permit area or in connection with the holder's activities in the permit area, regardless of whether those activities areauthorized under this permit. The holder shall perform cleanup or remediation immediately upon discovery of the release, threat of release, or discharge of hazardous materials. The holder shall perform the cleanup or remediation to the satisfaction of the authorized officer and at no expense to the United States. Upon revocation or termination of this permit, the holder shall deliver the site to the Forest Service free and clear of contamination.

VI. LAND USE FEE AND DEBT COLLECTION

A. **LAND USE FEES**. The use or occupancy authorized by this permit is exempt from a land use feeor the land use fee has been waived in full pursuant to 36 CFR 251.57 and Forest Service Handbook 2709.11, Chapter 30.

VII. REVOCATION, SUSPENSION, AND TERMINATION

A. **REVOCATION AND SUSPENSION**. The authorized officer may revoke or suspend this permitin whole or in part:

1. For noncompliance with federal, state, or local law.
2. For noncompliance with the terms of this permit.
3. For abandonment or other failure of the holder to exercise the privileges granted.
4. With the consent of the holder.
5. For specific and compelling reasons in the public interest.

Prior to revocation or suspension, other than immediate suspension under clause VII.B, the authorized officer shall give the holder written notice of the grounds for revocation or suspensionand a reasonable period, typically not to exceed 90 days, to cure any noncompliance.

B. IMMEDIATE SUSPENSION. The authorized officer may immediately suspend this permit in whole or in part when necessary to protect public health or safety or the environment. The suspension decision shall be in writing. The holder may request an on-site review with the authorizedofficer's supervisor of the adverse conditions prompting the suspension. The authorized officer's supervisor shall grant this request within 48 hours. Following the on-site review, the authorized officer's supervisor shall promptly affirm, modify, or cancel the suspension.

C. APPEALS AND REMEDIES. Written decisions by the authorized officer relating to administration of this permit are subject to administrative appeal pursuant to 36 CFR Part 214, as amended. Revocation or suspension of this permit shall not give rise to any claim for damages by theholder against the Forest Service.

D. TERMINATION. This permit shall terminate when by its terms a fixed or agreed upon condition, event, or time occurs without any action by the authorized officer. Examples include but are not limited to expiration of the permit by its terms on a specified date and termination upon change of control of the business entity. Termination of this permit shall not require notice, a decision document, or any environmental analysis or other documentation. Termination of this permit is not subject to administrative appeal and shall not give rise to any claim for damages by theholder against the Forest Service.

E. RIGHTS AND RESPONSIBILITIES UPON REVOCATION OR TERMINATION WITHOUT ISSUANCE OF A NEW PERMIT. Upon revocation or termination of this permit without issuance of a new permit, the holder shall remove all structures and improvements, except those owned by the United States, within a reasonable period prescribed by the authorized officer and shall restore the site to the satisfaction of the authorized officer. If the holder fails to remove allstructures and improvements within the prescribed period, they shall become the property of the United States and may be sold, destroyed, or otherwise disposed of without any liability to the United States. However, the holder shall remain liable for all costs associated with their removal, including costs of sale and impoundment, cleanup, and restoration of the site.

VIII. MISCELLANEOUS PROVISIONS

A. <u>MEMBERS OF CONGRESS</u>. No member of or delegate to Congress or resident commissionershall benefit from this permit either directly or indirectly, except to the extent the authorized use provides a general benefit to a corporation.

B. <u>CURRENT ADDRESSES</u>. The holder and the Forest Service shall keep each other informed ofcurrent mailing addresses, including those necessary for billing and payment of land use fees.

C. <u>SUPERSEDED PERMIT</u>. This permit supersedes a special use permit designated THEDALLES, CITY OF, BAR120802, dated 12/08/1964.

D. <u>SUPERIOR CLAUSES</u>. If there is a conflict between any of the preceding printed clauses andany of the following clauses, the preceding printed clauses shall control.

E. <u>WATER FACILITIES AND WATER RIGHTS</u> (D-25). This permit does not confer any waterrights on the holder. Any necessary water rights must be acquired by the holder in accordance with State law. Any expenses for acquiring water rights shall be the responsibility of the holder. The United States reserves the right to place any conditions on installation, operation, maintenance, and removal of facilities to pump, divert, store, or convey water on National Forest System lands coveredby this permit that are necessary to protect public property, public safety, and natural resources on National Forest System lands in compliance with applicable law. The holder waives any claims against the United States for compensation in connection with imposition of any conditions on installation, operation, maintenance, and removal of water facilities under this permit.

F. <u>SIGNS</u> (X-29). Signs or advertising devices erected on National Forest System lands shall have prior approval by the Forest Service as to location, design, size, color, and message. Erected signs shall be maintained or renewed as necessary to neat and presentable standards, as determined by theForest Service.

G. <u>IMPROVEMENT RELOCATION</u> (X-33). This authorization is granted with the express understanding that should future location of United States Government-owned improvements or roadrights-of-way require the relocation of the holder's improvements, such relocation will be done by, and at the expense of, the holder within a reasonable time as specified by the Authorized Officer.

THIS PERMIT IS ACCEPTED SUBJECT TO ALL ITS TERMS AND CONDITIONS. BEFORE ANY PERMIT IS ISSUED TO AN ENTITY, DOCUMENTATION MUST BE PROVIDED TO THE AUTHORIZED OFFICER OF THE AUTHORITY OF THE SIGNATORY FOR THE ENTITY TO BIND IT TO THE TERMS AND CONDITIONS OF THE PERMIT.

ACCEPTED:

Dave Anderson, Public Works Director, Dave Anderson 6/8/21

HOLDER NAME, PRECEDED BY NAME AND TITLE SIGNATURE DATE
OF PERSON SIGNING ON BEHALF OF HOLDER,
IF HOLDER IS AN ENTITYAPPROVED:

DUANE BISHOP
Acting Forest Supervisor

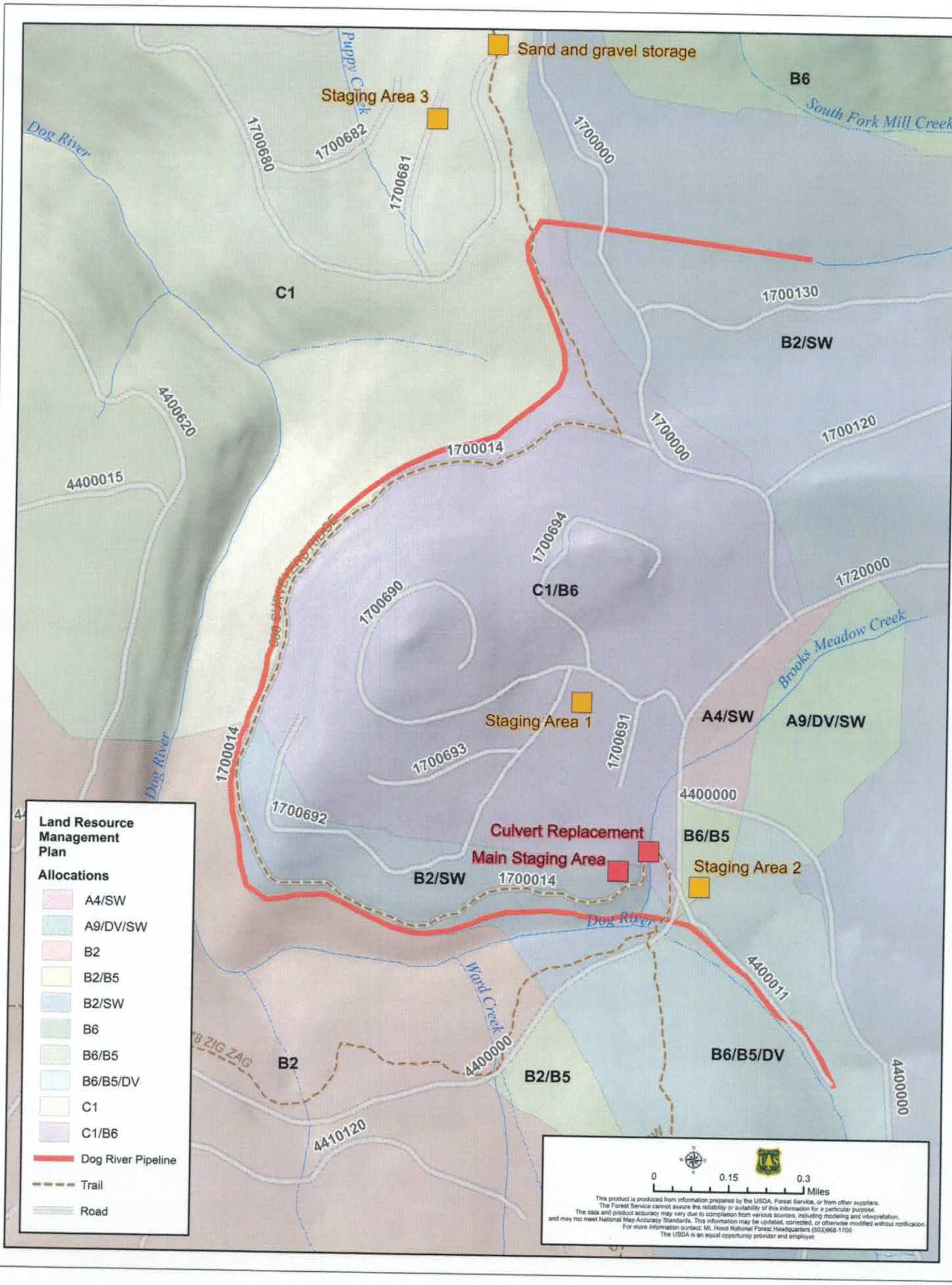
NAME AND TITLE OF AUTHORIZED OFFICER SIGNATURE DATE
Duane Bishop, Acting Forest Supervisor

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0082. The time required to complete this information collection is estimated to average one hour per response,including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and, where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any publicassistance. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call toll free (866) 632-9992 (voice). TDD users can contact USDA through local relay or the Federal relay at (800) 877-8339 (TDD) or(866) 377-8642 (relay voice). USDA is an equal opportunity provider and employer.

The Privacy Act of 1974 (5 U.S.C. 552a) and the Freedom of Information Act (5 U.S.C. 552) governthe confidentiality to be provided for information received by the Forest Service.


Sand and gravel storage
Staging Area 3
Puppy Creek
B6
South Fork Mill Creek
Dog River
1700680
1700682
1700681
1700000
C1
1700130
B2/SW
4400620
1700014
1700000
1700120
4400015
1700694
1720000
C1/B6
1700690
Brooks Meadow Creek
Staging Area 1
A4/SW
A9/DV/SW
1700014
1700693
1700691
4400000
1700692
Culvert Replacement
B6/B5
Main Staging Area
Staging Area 2
B2/SW
1700014
Dog River
4400011
Ward Creek
ZIG ZAG
B2
4400000
B2/B5
B6/B5/DV
4400000
4410120
Land Resource Management Plan
Allocations
A4/SW
A9/DV/SW
B2
B2/B5
B2/SW
B6
B6/B5
B6/B5/DV
C1
C1/B6
Dog River Pipeline
Trail
Road
0
0.15
0.3
Miles

APPENDIX B
OPERATION AND MAINTENANCE PLAN FOR WATER TRANSMISSION SYSTEM AND ASSOCIATED FACILITIES

This Operation and Management Plan (OM Plan) was prepared following the National Forest (NF) Land and Resource Management Plan (LRMP) and mandatory terms and condition clauses of the applicable Special Use Permit (Permit). This OM Plan will be part of the Permit upon signature by the authorized officer (AO). Provisions of this OM Plan are considered binding terms and conditions of the Permit and may be amended as conditions change.

This OM Plan is attached to and made a part of the Permit BAR166, issued to the City of The Dalles, effective on the execution of the AOs signature, and issued to (Holder) for the operation and maintenance of a water transmission system and associated facilities on the Barlow Ranger District, Mt. Hood National Forest, described in the Appendix A – Map.

This plan does not supersede or nullify any clauses of the Permit. It explains the general requirements to support public service, health and safety, and compliance with the applicable LRMP. It defines required actions by the Holder and emphasizes the high degree of coordination and cooperation necessary to satisfactorily fulfill these responsibilities. The conditions of this plan apply for all areas of operation authorized under the Permit and any future amendments.

Contacts & Communication:

The NF has a designated permit administrator who acts on behalf of the AO for special use authorizations. The AO has the authority to issue, grant, amend, renew, suspend, or revoke special use authorizations necessary for operation and maintenance activities. The permit administrator shall serve as the FS designated contact for all the Holder's operation and maintenance activities on NFS lands. Before starting any activities on NFS lands, the Holder's representative shall follow the terms and condition clauses of the permit (permit clauses), and with provisions described in this OM Plan, determine whether the activity would be considered Routine or Non-Routine Maintenance. Any Non-Routine Maintenance requries prior approval as described in the Non-Routine Maintenance section. The permit administrator coordinates any necessary approvals from the FS responsible official or the FS AO; and/or, if necessary, puts the Holder in contact with a designated representative for each affected ranger district.

Table 1. Mt. Hood National Forest contact information

Contact	Address	Phone Number	Email
Nathan Fletcher, Permit Administrator	70220 E. Highway 26, Zigzag, OR 97049	(503) 622-2030	Nathan.fletcher@usda.gov
Kameron Sam, District Ranger	780 NE Court Street, Dufur, OR 97021	(541) 467-5101	Kameron.sam@usda.gov

Table 2. Holder contact information

Contact Name	Contact Title	Address	Phone Number	Email
Dave Anderson	Public Works Director	1215 W 1st St, The Dalles, OR 97058	(541) 506-2008	danderson@ci.the-dalles.or.us
Eric Hansen	Asst Public Works Director	1215 W 1st St, The Dalles, OR 97058	(541) 370-2407	ehansen@ci.the-dalles.or.us
Larry McCollum	Water Quality Manager	6780 Reservoir Rd, The Dalles, OR 97058	(541) 298-2248 Ext5000	lmccollum@ci.the-dalles.or.us

Routine Operation & Maintenance:

Year-round access for routine maintenance and operations of the permit area is granted by the Authorized Officer. Routine operations and maintenance activities include, but are not limited to, inspection of facilities and their maintenance, addition of rocks and plastic to the diversion structure, and removal of debris and beaver dams. The Holder agrees to operate and maintain the facilities and use the granted land in accordance with the following stipulations:

1. Use only approved equipment listed below, and repair all damage resulting from said use. Ensure vehicles and equipment needed to perform emergency repairs have access to diversion, headgate and conveyance structure.

    a. Approved handheld equipment includes: chainsaws, shovels, pumps, pipe cut-off saws, impact wrenches and other hand tools.
    b. Approved heavy equipment includes: mini- and mid-sized excavators, wheeled loaders, tractor-mounted mowers. Heavy equipment authorized

can be transported on trailers behind pickup trucks. This equipment can be used for maintenance activities, such as:

i. Sediment removal
ii. Removal of fish screens
iii. Clearing debris along pipeline corridor or roadways
iv. Repairs of the pipeline (i.e. replaced failed seals at seams and maintain air/vacuum release valves)

c. Holder is still subject to federal and state laws regulating travel on State, County, and Federal lands. These include Code of Federal Regulations 36 CFR 261.13 <u>prohibiting travel in a manner which damages or unreasonably disturbs the land, wildlife and vegetative resources.</u>
d. Operations that involve traveling roadways, trails or other access located on forest Service land to the project shall cease when travel causes rutting 3" or more in depth.
e. Any rocks moved to access water facilities shall be placed back following end of operation and maintenance activities unless said rocks may compromise access to or the structural integrity or operation of the pipeline.
f. Holder shall cut and pull back any downed trees blocking the access routes and shall not leave the trail in order to go around the trees except when using a snow cat and the area is covered by snow.

2. Holder should inspect water facilities monthly during operations and following any known significant and relevant seismic or landslide events. Diversion, headgate and screening systems should be inspected to ensure proper functioning.

3. Maintain diversion, headgate, screening, fish passage and conveyance structure in good functioning condition and clear of sediment, logs and other debris to ensure proper operation and facilitate inspection.

4. The Holder shall be responsible for prevention and control of soil erosion and gullying on lands covered by this authorization resulting from operations, maintenance and termination of the authorized use. The Holder shall revegetate or otherwise stabilize all ground where the soil has been exposed as a result of the Holder's operations, maintenance and termination of the authorized use. The Holder shall be responsible for control of and spread of those noxious weeds which are the result of its activities, and which have been identified by the US Forest Service and local County weed list.

5. To protect environmental and aquatic resources, the Holder to the extent feasible within its operational objectives and state-issued water rights, shall allow water it bypasses to flow below the diversion into the natural stream channel.

6. The Holder shall install, maintain and operate an acceptable measuring device for determining the amount of water being diverted and the amount being bypassed. Holder shall provide that a minimum of 0.5 cubic feet per second (cfs) of bypass

flows is maintained in the months of August, September and October. Information on the amount of water diverted and bypassed will be provided to the Authorized Officer upon request.

7. If any items of archaeological, paleontological, or historic value, including but not limited to historic or prehistoric artifacts, structures, monuments, human remains and funerary objects (grave goods), are discovered, the Holder shall immediately cease all activities which may disturb such items and notify the Forest Service. The Holder will notify the Forest Service and shall not resume activities until written approval is given by the authorized officer. Failure to comply with this stipulation may result in civil or criminal penalties under the Archaeological Resources Protection Act of 1979.

Non-Routine Operation & Maintenance:

1. If any non-routine activities need to be performed, the Holder shall notify and request approval from the authorized officer during annual proposal submission periods. The FS shall respond to the Holder's request for non-routine activities and subsequently complete any necessary environmental analysis; identify any special design measures or conditions that may need to be followed to protect natural resources and/or the public; and, if needed, modify the Permit. Requests received outside of the annual proposal submission periods will be evaluated by the District Ranger, who at that time will determine if the Forest will or will not accept the proposal. Proposals that involve work that is part of public health and safety of those that will result in protection or improvement of a resource may be prioritized. Submitting proposals outside of the open season may result in delays.

2. The Holder will contact the Authorized Officer for approval before proceeding with work that is other than routine operations or maintenance (as described below). Some of the situations requiring notification and approval include:

    a. Bringing in and using heavy equipment other than that specified above.
    b. Removal of significant amounts of vegetation and silt and deposition of the same, if on National Forest System lands.
    c. Burning, application of seed mixtures, chemical application or other means of vegetation control measures.
    d. Major reconstruction of facilities, such as reconstruction or re-routing of a portion of the pipeline (the latter would also entail a new easement or special use permit).
    e. Maintenance work that deviates from historical activities or that causes disturbance in excess of typical and historic activities associated with the system, which may affect cultural resources. Such work may require prior cultural review and approval by the Forest Service.
    f. Any work performed within natural waterways, other than the removal of sediment, fallen trees or other encroaching debris that adversely affects

operation of the pipeline systems, must have prior approval from the Forest Service.

Emergency Situations:

1. In case of an emergency situation, the Holder shall be prepared to respond and may coordinate with relevant agencies to protect public health and the environment. If there is an emergency, the Forest Service shall be notified and appraised of situation and remedial action as soon as practical. At a minimum, an email to the permit administrator prior to mobilization of crews and commencement of work is required. The Holder will implement procedures within the OM Plan during emergency response activities and in consultation with the Forest Service will address environmental concerns, including those that may arise during post-emergency activities, restoration, and follow-up.
2. The holder must obtain appropriate fill/removal permits from Oregon Division of State Lands and Corps of Engineers if working in jurisdictional waters or wetlands.

Best Management Practices (BMPs):

BMPs for guidance on soil disturbing actions will take effect following signature from the Authorized Officer and will be made part of this Operation and Maintenance Plan following execution.

Procedures for Modification of Operating Plan or Agreement:

This Operation and Maintenance Plan will be reviewed every five (5) years by the Holder and the Forest Service. In addition to the authority of the Authorized Officer to unilaterally revise or modify this operation and maintenance plan pursuant to those certain circumstances prescribed in paragraph III(C) of this permit, this operation and maintenance plan may also be amended by mutual agreement signed and dated by the Holder and the District Ranger.

8. U.S. Forest Service Utilities Permit.

Prescribed by DOI/USDA/DOT P.L. 96-487 and Federal Register Notice 5-22-95	**APPLICATION FOR TRANSPORTATION AND UTILITY SYSTEMS AND FACILITIES ON FEDERAL LANDS**	FORM APPROVED OMB Control Number: 0596-0082 Expiration Date: 8/31/2020
		FOR AGENCY USE ONLY
NOTE: Before completing and filing the application, the applicant should completely review this package and schedule a preapplication meeting with representatives of the agency responsible for processing the application. Each agency may have specific and unique requirements to be met in preparing and processing the application. Many times, with the help of the agency representative, the application can be completed at the preapplication meeting.		Application Number Date Filed
1. Name and address of applicant (*include zip code*) City of The Dalles 313 Court Street The Dalles, OR 97058	2. Name, title, and address of authorized agent if different from item 1 (*include zip code*) Dave Anderson, Pubic Works Director 1215 W 1st Street The Dalles, OR 97058	3. Telephone (*with area code*) (541)506-2008 Applicant City of The Dalles Authorized Agent Dave Anderson

4. As applicant are you? (*check one*)

- a. ☐ Individual
- b. ☐ Corporation*
- c. ☐ Partnership/Association*
- d. ☐ State Government/State Agency
- e. ☒ Local Government
- f. ☐ Federal Agency

** If checked, complete supplemental page*

5. Specify what application is for: (*check one*)

- a. ☐ New authorization
- b. ☒ Renewing existing authorization number
- c. ☐ Amend existing authorization number
- d. ☐ Assign existing authorization number
- e. ☐ Existing use for which no authorization has been received *
- f. ☐ Other*

** If checked, provide details under item 7*

6. If an individual, or partnership, are you a citizen(s) of the United States? ☐ Yes ☐ No

7. Project description (describe in detail): (a) Type of system or facility, (*e.g., canal, pipeline, road*); (b) related structures and facilities; (c) physical specifications (*Length, width, grading, etc.*); (d) term of years needed: (e) time of year of use or operation; (f) Volume or amount of product to be transported; (g) duration and timing of construction; and (h) temporary work areas needed for construction (*Attach additional sheets, if additional space is needed.*)

This application is for renewal of the 1964 special use permit for the Dog River water transmission pipeline. It will provide for the ownership, construction, operation, maintenance and replacement of the pipeline. The renewed permit is requested to be for the design service life of the new pipeline — 100 years. The existing 20-inch diameter wooden pipeline is to be replaced with a new approximately 3.5-mile long 24-inch diameter pipeline made of modern pipe materials. Associated facilities include a diversion weir in Dog River, intake structures, fish screening and passage systems, flow monitoring systems and associated power and communication systems, and pipeline outlet works above the headwaters of South Fork Mill Creek. Pipeline construction will include timber removal along the pipeline corridor. The pipeline will operate year-round with a maximum capacity of about 26 cubic feet per second.

Timber removal for the new pipeline is planned to occur in Spring-Fall 2021. Construction of the replacement pipeline and associated structures are planned to occur in 2022 and 2023. Temporary work and staging areas are to be utilized as described in the Environmental Assessment for the project dated June 2020 or as agreed in subsequent coordination with US Forest Service.

Operation of the 24-inch pipeline will provide a minimum 0.5 cfs bypass flows in Dog River during Aug, Sept and Oct.

8. Attach a map covering area and show location of project proposal

9. State or Local government approval: ☐ Attached ☐ Applied for ☒ Not Required

10. Nonreturnable application fee: ☐ Attached ☒ Not required

11. Does project cross international boundary or affect international waterways? ☐ Yes ☒ No (*if "yes," indicate on map*)

12. Give statement of your technical and financial capability to construct, operate, maintain, and terminate system for which authorization is being requested.

City of the Dalles is a municipal corporation that provides domestic water to its residential, commercial, industrial and government customers. Utility rates collected from customers fund operation and maintenance of the City's water system infrastructure. The City has operated and maintained the existing wooden Dog River pipeline for over 110 years and will continue to do so for a replacement pipeline.

13a. Describe other reasonable alternative routes and modes considered.

A shorter alternate route was evaluated which would have including the tunneling of a pipeline through a ridge between Dog River and South Fork Mill Creek.

b. Why were these alternatives not selected?

The tunneling alternative would have doubled the estimated cost of construction for the project and would have been far beyond the financial resources available to the City. Also, future pipeline maintenance would have been complicated due to the depth of a tunneled pipeline.

c. Give explanation as to why it is necessary to cross Federal Lands.

The water source (Dog River) to which the City holds water rights and the receiving stream (South Fork Mill Creek), as well as all lands between the two for routing of the pipeline, are all located on Federal Lands.

14. List authorizations and pending applications filed for similar projects which may provide information to the authorizing agency. *(Specify number, date, code, or name)*

Decision Notice and Finding of No Significant Impact for Dog River Pipeline Replacement, USDA Forest Service signed by Richard Periman, Mt Hood National Forest Supervisor, Oct 1, 2020

15. Provide statement of need for project, including the economic feasibility and items such as: (a) cost of proposal (construction, operation, and maintenance); (b) estimated cost of next best alternative; and (c) expected public benefits.

Provided in Dog River Pipeline Replacement Environmental Assessment issued by US Forest Service, June 2020.

16. Describe probable effects on the population in the area, including the social and economic aspects, and the rural lifestyles.

Provided in Dog River Pipeline Replacement Environmental Assessment issued by US Forest Service, June 2020.

17. Describe likely environmental effects that the proposed project will have on: (a) air quality; (b) visual impact; (c) surface and ground water quality and quantity; (d) the control or structural change on any stream or other body of water; (e) existing noise levels; and (f) the surface of the land, including vegetation, permafrost, soil, and soil stability.

Provided in Dog River Pipeline Replacement Environmental Assessment issued by US Forest Service, June 2020.

18. Describe the probable effects that the proposed project will have on (a) populations of fish, plantlife, wildlife, and marine life, including threatened and endangered species; and (b) marine mammals, including hunting, capturing, collecting, or killing these animals.

Not Likely to Adversely Affect as provided in Dog River Pipeline Replacement Environmental Assessment issued by US Forest Service, June 2020 and Finding of No Significant Impact issued by USFS Mt. Hood National Forest Supervisor Oct 1, 2020.

19. State whether any hazardous material, as defined in this paragraph, will be used, produced, transported or stored on or within the right-of-way or any of the right-of-way facilities, or used in the construction, operation, maintenance or termination of the right-of-way or any of its facilities. "Hazardous material" means any substance, pollutant or contaminant that is listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq., and its regulations. The definition of hazardous substances under CERCLA includes any "hazardous waste" as defined in the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, 42 U.S.C. 6901 et seq., and its regulations. The term hazardous materials also includes any nuclear or byproduct material as defined by the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 et seq. The term does not include petroleum, including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under CERCIA Section 101(14), 42 U.S.C. 9601(14), nor does the term include natural gas.

None anticipated.

20. Name all the Department(s)/Agency(ies) where this application is being filed.

US Forest Service

I HEREBY CERTIFY, That I am of legal age and authorized to do business in the State and that I have personally examined the information contained in the application and believe that the information submitted is correct to the best of my knowledge.

Signature of Applicant	Date
	2/3/2021

Title 18, U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

9. U.S. Forest Service Roads Use Permit.

PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.

10. Department of Environmental Quality (DEQ) CWA Section 401 Water Quality Certification (NWS-2017-25).

PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.

11. Oregon Department of Environmental Quality (DEQ) 1200C (NWS-2017-25).

PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.

12. Oregon Department of State Lands (DSL) Removal Fill Permit.

PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.

13. Oregon Department of Fish and Wildlife (ODFW) Fish Passage.

PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.

14. Oregon Department of Fish and Wildlife (ODFW) Scientific Collection.

PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.

15. Plans - SWPPP NPDES Construction Stormwater Discharge Notice of Intent (#WAR309715).

PERMIT APPLICATION SUBMITTED BY OWNER. PERMIT APPROVAL IS PENDING, WITH ANTICIPATED PERMIT ISSUANCE BY CONTRACT AWARD DATE.