Sampling and Analysis Plan

Volunteer Water Quality Monitoring

Noble Creek Tidegate Replacement, Coos County, OR

February 2024

State of Oregon
DEQ Department of Environmental Quality

This document was prepared by
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Project approvals

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Coos Soil and Water Conservation District

Reviewed by:

_____ **Date:** _____

Ben Hamilton, DEQ Quality Assurance Officer (QAO)

Approved by:

_____ **Date:** _____

Nick Haxton-Evans, Volunteer Monitoring Coordinator/DEQ Project Manager

Signed copy on file

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1. Project Management

1.1. Distribution List

Participants in the Noble Creek Tidegate Replacement Project (SIA) Monitoring Project will receive electronic notification of the Sampling and Analysis Plan (SAP) document and subsequent revisions. The official signed document shall be filed by the Oregon Department of Environmental Quality (DEQ) laboratory. The monitoring project is expected to continue through multiple years, so revisions may be necessary. The Project Manager may revise the SAP, which shall be approved by the signatories under Project Approvals. Coos SWCD and Oregon DEQ are not responsible for the control of reprinted copies from the web sites or photocopies of the original plan. It is the responsibility of the reader to ensure they are using the most current *DEQ Sampling and Analysis Plan.*

The following personnel will be emailed regarding all aspects of this sampling and analysis plan (SAP). Deviations from this SAP must be communicated in writing (email is acceptable) to all individuals identified in Table 1. Final reports from the DEQ Laboratory will be emailed to the project manager, regional monitoring coordinator and laboratory monitoring coordinator/data manager.

Table 1 Distribution List

Name	Phone	Email
Andrew Chione, Project Manager, Coos Soil and Water Conservation District	541-396-6879	wqprojectmanager@coosswcd.org
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1.2. Project/task organization

Monitoring Organization(s): **Coos Soil and Water Conservation District**
379 N. Adams St, Coquille, Oregon 97423
541-824-0356

Analytical Organization: **Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians**
1245 Fulton Avenue
Coos Bay, OR 97420
Contact: Janet Niessner, Environmental Scientist
541-888-1304

1.3. Problem definition/background

The Noble Creek Tidegate Replacement Project will improve fish passage, habitat quality, and water quality in the Noble Creek Watershed in Coos County, Oregon. The Noble Creek Watershed flows into Isthmus Slough, a tributary of Coos Bay. Extensive wetlands in the lowlands of the Noble Creek Watershed historically flooded

on a tidal cycle. These tidal wetlands were ditched and drained in the late 1800s and the early 1900s for use as pastures for livestock grazing. The stream channels of Noble Creek and its tributaries were straightened into a ditch network. Tidegates were installed to reduce flooding so that former wetlands could produce grass for cattle. These actions by Euro-American settlers degraded the habitat and water quality of the watershed. Currently, the tidegates in the Noble Creek Watershed have reached the end of their functional lifespan, and flooding of former tidal wetlands is increasing. Agricultural Best Management Practices (BMPs) for grazing in wetlands and along streams are generally not practiced in the Noble Creek Watershed. Livestock loitering in and along stream channels and flooded wetlands is negatively impacting water quality through the inputs of fecal coliform bacteria, nutrients, and excessive sediment. Increased flooding due to failing flood-control infrastructure has exacerbated the water quality issue by mobilizing bacteria and sediment pollution alongside stream channels that would otherwise filter through vegetation and soil.

Water quality issues identified by Coos SWCD staff in the project area include:

- Livestock trampling stream banks and loitering in streams and wetlands
- Insufficient riparian vegetation to filter nutrients and bacteria from livestock waste and sediment from disturbed ground

The Coos Soil and Water Conservation District (Coos SWCD) is designing a comprehensive solution for the coexistence of agriculture, fish and wildlife habitat, and water quality in the Noble Creek Watershed. Flood-control infrastructure, including tidegates and dikes, will be reconstructed and managed to provide better fish passage, increase agricultural pasture quality, and reduce water quality pollution from livestock. A large pasture will be restored to functional wetland, and riparian buffers will be restored on remaining pastures to protect water quality.

The improvement of agricultural water quality is a major component of the Noble Creek Tidegate Replacement Project, so Coos SWCD is proposing to conduct baseline and effectiveness monitoring. Monitoring objectives include evaluating current water quality conditions in the watershed and assessing the effectiveness of agricultural BMPs implemented through restoration.

According to the Oregon Department of Environmental Quality's (ODEQ) *Oregon 2022 Integrated Report*, fecal coliform bacteria is an impaired water quality parameter in Noble Creek and water temperature (year-round) and fecal coliform bacteria are impaired parameters in Isthmus Slough. So, these parameters were selected by Coos SWCD for monitoring.

1.4. Project/task description

The Coos Soil and Water Conservation District will monitor *E. coli*, enterococci, salinity, and water temperature in the project area, which includes the Noble Creek Watershed and upper Isthmus Slough. Monitoring sites will be located below potential pollution sources, at tributary junctions, and above and below the project area. Bacteria (*E. coli* & enterococci) monitoring will take place during low, outgoing tides. Monitoring of bacteria parameters will take place six times during a 90-day period, twice per year, for a total of 12 monitoring events. The two, 90-day monitoring periods will take place from June – August and from November – January during each year of monitoring. Bacteria samples will be analyzed for the most probable number (MPN) of bacteria organisms per 100 mL of water. The resulting concentrations will be compared with Oregon regulatory limits on bacterial pollution for freshwater contact recreation and coastal water contact recreation. Salinity will be monitored at the same locations and times as *E. coli* and enterococci. This parameter will be analyzed for parts per thousand (ppth) and compared with the threshold of 10ppth that DEQ has established as dividing the

designated uses of freshwater contact recreation and saltwater contact recreation. Salinity results will also be compared with corresponding E. coli and enterococci concentrations to assess whether a significant relationship is present. Water temperature monitoring will be conducted continuously from May 15th through September each year to obtain the "Seven-Day Average Maximum Temperature" during that time period. The resulting number will be compared with the Oregon regulatory limit for water temperature for salmon and steelhead rearing and migration.

Coos SWCD is committed to completing the project as defined. However, the following circumstances may limit our ability to do so:

- Landowners withdrawing property access permission
- Illness of or injury to Coos SWCD employees
- Employee turnover at Coos SWCD or at partner agencies or organizations involved with the project
- High stream flows, extreme weather events, or vandalism causing damage to or loss of temperature loggers

Table 2 Water quality monitoring monthly schedule

Tasks to be completed	Months for year 2024 - 2026											
	1	2	3	4	5	6	7	8	9	10	11	12
Monitoring planning and revision	x	x	x								x	x
Temperature logger quality control testing				x	x					x		
Continuous temperature data collection					x	x	x	x	x	x		
Temperature logger auditing					x			x		x		
Bacteria data collection	x					x	x	x			x	x
Bacteria Laboratory analysis	x					x	x	x			x	x
Data entry	x	x				x	x	x			x	x
Data analysis	x	x				x	x	x			x	x
Reporting	x	x	x									

1.5. Quality objectives and criteria

Monitoring is intended to measure ambient baseline conditions of *E. coli* and enterococci concentrations and summer water temperatures prior to implementation of a water quality improvement project. Salinity monitoring is intended to help interpret the results of E. coli and enterococci monitoring. The monitoring project is designed to collect "A-level" data by following the procedures outlined in the DEQ *Volunteer Water Quality Monitoring Quality Assurance Project Plan, ver. 3.0* (QAPP), the DEQ *Continuous Water Monitoring Procedures*, and the DEQ *Data Quality Matrix, ver. 5.0*.

1.6. Training Requirements and Certification

Coos SWCD staff have several years of experience implementing water quality monitoring projects. Staff are familiar with DEQ requirements for data collection and quality control procedures. Anyone who assists Coos SWCD staff collect water quality data will be trained to meet DEQ standards for data collection and quality control.

1.7. Documentation and Records

Coos SWCD will follow the Document Retention Policy outlined in the QAPP for all documents relevant to their study. See Table 3 for a list of documents and retention times. If any documents are revised by Coos SWCD, a revised copy of the document will be sent to the DEQ volunteer monitoring coordinator for storage at the DEQ laboratory.

Table 3 Controlled Documents

Document or Record Name and Description	Storage Location	Storage Time
DEQ Quality Assurance Project Plan (QAPP) - DEQ04-LAB-0047-QAPP project description and assurance procedures.	DEQ internet page & Coos SWCD office & network server	10 years
Coos SWCD Sampling Analysis Plan – specific monitoring information for each group's activities.	DEQ laboratory, Coos SWCD office & network server	10 years
OWEB Water Quality Monitoring Guidebook and ODEQ Laboratory Mode of Operations Manual – methods manual	Coos SWCD office & network server	Perpetuity
Equipment Notebooks - records of quality control checks, calibrations, and maintenance	Coos SWCD office & network server	Perpetuity
Field Data or Chain of Custody Sheets/Electronic Files – Field forms containing monitoring meta data and raw field data.	Coos SWCD office & network server	Perpetuity
Reports – annual and final reports and data analysis	Coos SWCD office & network server	Perpetuity
Digital Data – field data, laboratory data, data analysis	Coos SWCD office and network server, DEQ laboratory	Perpetuity
Original Records - data submitted to DEQ by CBO for review, reformatting and upload into LIMS	DEQ laboratory: Vol Data Drive, Coos SWCD office & network server	10 years

2. Data Generation and Acquisition

2.1. Monitoring Process Design

Monitoring design, collection, methods, and handling will be managed by the monitoring organization identified in section 1.2. The monitoring organization will ensure that all samples will be collected in the appropriate sample containers, preserved as identified in the appropriate reference methods, and transported to the analytical organization within the appropriate sample holding times, with the appropriate documentation, and under the appropriate sample transport conditions. Analytical laboratories assume no responsibility for the quality of data resulting from samples that were collected, shipped, or stored under inappropriate conditions.

The goal of water quality monitoring for the Noble Creek Tidegate Replacement Project is to answer the following research questions:

1. What are the baseline water quality conditions in the project area?

2. Can agricultural Best Management Practices implemented through the Noble Creek Tidegate Replacement Project improve water quality conditions in the project area?

Coos SWCD will monitor *E. coli*, enterococci, and water temperature because these parameters are listed by DEQ as impaired in the project area. Specifically, fecal coliform bacteria is an impaired water quality parameter in Noble Creek. Water temperature (year-round) and fecal coliform bacteria are impaired parameters in Isthmus Slough. Salinity will be monitored to provide context for E. coli and enterococci results. Monitoring will take place over two years, prior to the implementation of the Noble Creek Tidegate Replacement Project. Coos SWCD intends to conduct effectiveness monitoring in the future, following implementation of the project.

Coos SWCD will monitor fecal coliform bacteria in the project area by monitoring both *E. coli* and enterococci. Enterococci are used by DEQ as the indicator organisms for bacterial pollution in saltwater and *E. coli* are used as the indicator organism for bacterial pollution in freshwater. The salinity in the project area varies throughout the year, with generally higher salinity in the summer months and lower salinity during winter months. Monitoring of both *E. coli* and enterococci is intended to detect bacterial pollution across varying salinity levels. Coos SWCD anticipates that *E. coli* will be the more-prevalent bacterial species in the water during periods of low salinity and that enterococci will be more prevalent during periods of high salinity. Bacteria monitoring will take place during two, 90-day periods. During each 90-day period, a total of six monitoring events will occur. This averages one monitoring event approximately every two weeks during each 90-day monitoring period. The selected monitoring frequency is intended to collect enough data to compare results with the pollution limits outlined in Oregon Administrative Rule (OAR) 340-041-0009. These limits are as follows:

“340-041-0009
Bacteria

(1) Numeric Criteria: Organisms commonly associated with fecal sources may not exceed the criteria in subsections (a)-(c) of this section:

(a) Freshwater contact recreation:

(A) A 90-day geometric mean of 126 E. coli organisms per 100 mL;

(B) No single sample may exceed 406 E. coli organisms per 100 mL.

(b) Coastal water contact recreation, as designated in OAR 340-041-0101, 340-041-220, 340-041-230, 340-041-300 and 340-041-0320:

(A) A 90-day geometric mean of 35 Enterococcus organisms per 100 mL;

(B) Not more than ten percent of the samples may exceed 130 organisms per 100 mL.

(c) Shellfish harvesting, as designated in 340-041-0101, 340-041-220, 340-041-230, 340-041-300 and 340-041-0320:

(A) A fecal coliform median concentration of 14 organisms per 100 mL;

(B) Not more than ten percent of the samples may exceed 43 organisms per 100 mL.

(2) A minimum of five samples in a 90-day period is required for calculating the criteria in sections (1)(a)(A) and (1)(b)(A) and (B) of this rule."

The two, 90-day monitoring periods for bacteria will occur at opposite times of year to capture water quality conditions at contrasting salinity and streamflow levels. One monitoring period will occur from June - August and the second monitoring period will occur from November – January. The water level varies throughout the day in the project area due to tidal influence. To reduce the influence of downstream water quality conditions on the data, monitoring will be conducted when the tide is low and outgoing.

Salinity will be monitored at the same locations and times as E. coli and enterococci so that salinity measurements can be compared with bacterial concentrations. The salinity results will be compared with 10 ppth to determine if salinity conditions are met for measuring either E. coli for freshwater contact recreation or enterococci for saltwater contact recreation. Repeated measures correlation will be used to determine if significant relationships are present between salinity and E. coli, salinity and enterococci, and E. coli and enterococci.

Temperature monitoring will occur continuously from May 15 – September 31, to coincide with the timing of low streamflow conditions when water temperatures are usually limiting to juvenile salmonid survival. Temperature will be measured in degrees Celsius and analyzed for the "Seven-Day Average Maximum Temperature", which is the calculation used by DEQ to set water temperature limits. Measurements will be compared with the fish use designations set by DEQ for the specific waterway where each sample was collected. The fish use designation within the project area during the May - September monitoring period is "Salmon and Trout Rearing and Migration". This designation has an upper limit of 18.0˚C for the seven-day average maximum water temperature.

A total of 5 sites will be monitored in the project area. The monitoring sites will be at the following types of locations:

- At locations where livestock frequently loiter in the stream channel and riparian areas; This will quantify water quality pollution and document changes from improved management practices.
- At tributary junctions to identify areas with the highest pollution levels; This will focus water quality improvement efforts
- Upstream of the influence of agriculture in Noble Creek, to differentiate the influence of wildlife on bacterial pollution and differentiate it from agricultural influence downstream
- At regular intervals on Noble Creek to quantify how water quality parameters change through the project area
- Downstream of the project area to quantify pollution from all upstream sources

Bacteria/salinity and temperature sites will be identical except for the farthest downstream sites, which will be approximately 200 ft apart (see figures 1 & 2). The separate location of the temperature site is necessary to completely hide the temperature logger from view at this publicly accessible location. This will reduce the likelihood of the loss of data due to theft of the temperature logger.

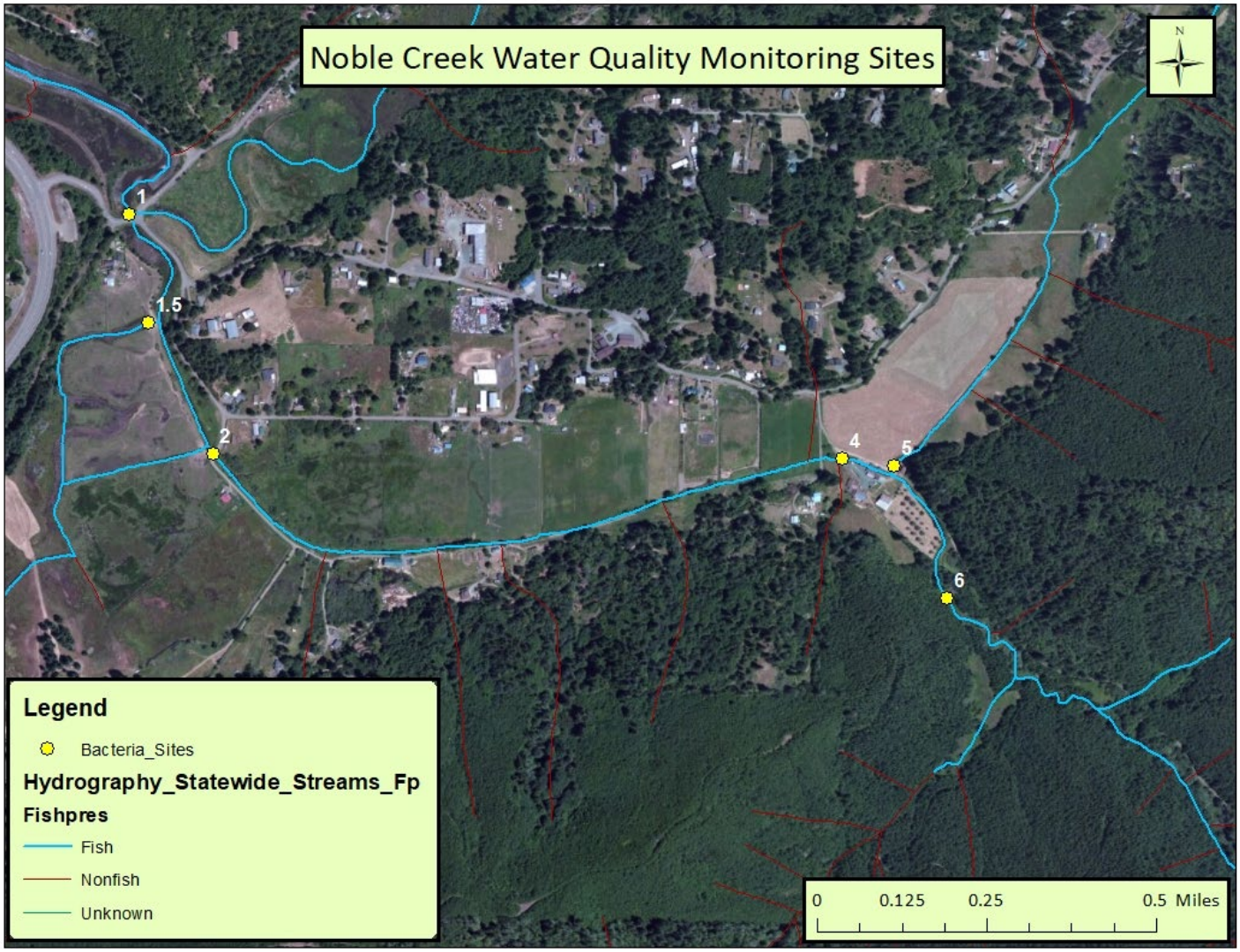

Figure 1. Fecal coliform bacteria and salinity monitoring sites in the project area

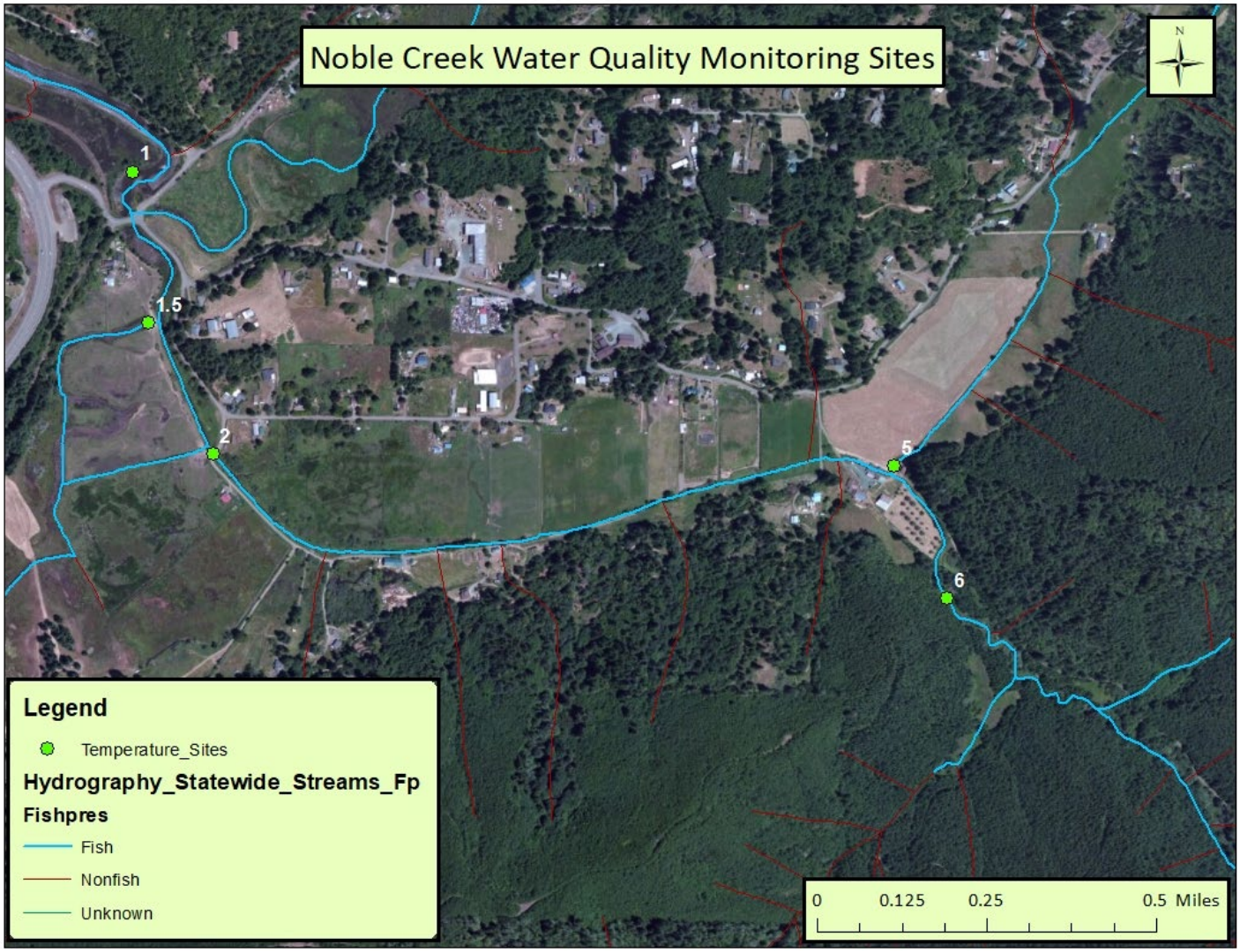

Figure 2. Temperature monitoring sites in the project area

The monitoring locations are summarized in Table 4.

Table 4 Bacteria/Salinity Monitoring Locations

DEQ Station ID *	Organizational Site ID	Latitude/Longitude	Station Description	Site Type
TBD	NB1	43.256854, -124.215440	Isthmus Slough Below Main Tidegate	Downstream of project area
TBD	NB1.5	43.254515, -124.215104	Pasture Channel by Old Tidegate	Livestock access location, tributary junction
TBD	NB2	43.25244, -124.21384	Noble Creek Below Bramble Lane Bridge	Tributary junction, regular interval
TBD	NB4	43.252378, -124.200376	Noble Creek Downstream of Ferry Creek	Tributary junction, regular interval

TBD	NB5	43.252288, -124.199268	Ferry Creek Upstream of Noble Creek	Tributary junction
TBD	NB6	43.25016, -124.19807	Noble Creek Upstream of Ferry Creek	Tributary Junction, Upstream of agricultural influence

*If a Station ID number is not available during QAPP/SAP development, the DEQ Laboratory will generate the unique identifier prior to data processing.

Table 5 Temperature Monitoring Locations

DEQ Station ID *	Organizational Site ID	Latitude/Longitude	Station Description	Site Type
TBD	NT1	43.256854, -124.215440	Isthmus Slough Below Main Tidegate	Downstream of project area
TBD	NT1.5	43.254515, -124.215104	Pasture Channel by Old Tidegate	Tributary junction, regular interval
TBD	NT2	43.25244, -124.21384	Noble Creek Below Bramble Lane Bridge	Livestock access location, tributary junction
TBD	NT5	43.252378, -124.200376	Noble Creek Downstream of Ferry Creek	Regular interval
TBD	NT6	43.252288, -124.199268	Ferry Creek Upstream of Noble Creek	Upstream of agricultural influence

2.2. Monitoring methods

Bacteria (*E. coli* & enterococci)

Bacteria samples will be collected in sterile, 120 mL sample bottles. At field sites with wading access, samples will be collected by hand. A sterile sample bottle will be submerged in the water upstream of where the sampler is standing. Monitoring sites at bridges will be sampled using a sterile, 120 mL sample bottle inside a stainless-steel monitoring bucket. The bucket will be lowered on a rope into the water to a depth of 1m, or if the water depth is less than 1m, to half the depth of the water column. The bucket will not be allowed to touch the stream bottom to avoid disturbing sediment. Before each use, the stainless-steel monitoring bucket will be rinsed with environmental water from the site. A fresh pair of sterile, disposable gloves will be worn any time an open sample bottle is handled to avoid cross-contamination. Within eight hours of the first sample collection, the samples will be delivered to the laboratory for analysis.

Salinity

Salinity will be monitored in-stream using a conductivity/temperature sensor on a portable, multiparameter sonde. The sonde will be lowered to a water depth of approximately 0.5 m at each monitoring site. A measurement will be recorded after the salinity readings have stabilized.

Temperature

Continuous temperature monitoring will take place in-stream using Onset U22-001 water temperature data loggers. Each data logger will be housed in a stainless-steel with perforated PVC caps, which will be

submerged at the monitoring site. The pipe will protect the data logger from physical impacts and will anchor the data logger to the bottom of the stream. The data logger will be placed in the thalweg of the stream in a location that appears unlikely to become dry over the summer. A cable will connect the data logger housing to a nearby tree or other solid object. Data loggers will be programmed to record water temperature measurements every 15 minutes. Deployment of data loggers will last from May 15th through the end of September of each monitoring year.

2.3. Sample handling and custody

Bacteria (*E. coli* & enterococci)

At the time of collection, each sample bottle will be labeled with the date, time, site ID number, and type of sample (standard, duplicate, or blank). The same information will be recorded on a data collection sheet/Chain of Custody (COC) form after each sample is taken (see figure 3). Precipitation event will also be recorded if an event has occurred within the preceding 24 hours of sample collection. Samples will be stored on ice at a temperature between 1-4°C and delivered to a laboratory for analysis within 8 hours of the first sample being collected. In the field and during transport to the lab, all bacteria samples will be in the direct control of the sampler. The sampler will be responsible for maintaining the security and organization of the samples until they are transferred to another person. Upon transfer of samples, the COC form will be signed and dated by both parties. After each monitoring day, the completed COC will be scanned and saved to the Coos SWCD file server.

Salinity

Salinity measurements will be recorded electronically on a digital tablet that is connected to the sonde via Bluetooth®. The measurements will also be recorded on a physical data sheet (see figure 4), in addition to the date, time, site ID number, and type of sample (standard, duplicate, or blank). Upon return to the office, the data files will be transferred from the tablet to the Coos SWCD server and the data will be manually entered into a database.

Temperature

A data sheet will be used to fill out appropriate information for each temperature monitoring site (see figure 4). Information recorded on the data sheet will include the dates and times of temperature logger deployments, field audits, and logger retrievals. The logger ID will also be recorded for each site, in addition to site coordinates. Information from the data sheet will be entered into a database on the Coos SWCD server.

Table 6 Summary of monitoring parameters

Sample Type	Container	Preservation	Holding Time
E. coli & enterococci	Sterile plastic 120mL bottle	On ice, kept between 1-4˚C	8hr
Salinity	In-stream	None	Immediately
Temperature	In-stream	None	Immediately

2.4. Analytical methods

Analysis for all parameters will follow the methods outlined in Oregon DEQ's *Volunteer Water Quality Monitoring Quality Assurance Project Plan* (Version 3.0, July 2021), Oregon DEQ's *Continuous Water Monitoring Procedures* (May 2020), and in chapter 4 of Oregon DEQ's *Water Monitoring and Assessment Mode of Operations Manual* (Version 3.2, March 2009).

Temperature and salinity will be analyzed in-situ. Laboratory analysis of *E. coli* and enterococci will be contracted to the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) Environmental Testing Laboratory, which is currently pursuing ORELAP accreditation. The IDEXX Quanti-Tray 2000® MPN method will be used for *E. coli* analysis and the IDEXX Enterolert® method will be used for enterococci analysis.

Table 7 Summary of analytical parameters and methods

Sample Type	Parameter	Reference Method (required)
Surface water sample	*E. coli*	SM 9223B
Surface water sample	Enterococci	SM 9230D
In-situ	Specific conductance	SM 9050A
In-situ	Temperature	EPA 170.1

2.5. Quality control

Bacteria (*E. coli* & enterococci)

Quality Control (QC) procedures for E. coli and enterococci will follow those outlined in the *Volunteer Monitoring Program QAPP* and the *Data Quality Matrix ver. 5.0*. The accuracy of bacteria grab samples will be tested by performing split samples with a DEQ employee once during the project, if possible. One blank sample will be collected during each monitoring day using distilled water. The methods used to collect the blank sample will match those used to collect standard samples.

The precision of bacteria samples will be evaluated by collecting duplicate samples within 15 feet and 15 minutes of the same locations as corresponding standard samples. The number of duplicate samples will be ≥10% of the standard samples collected or one sample per field-monitoring day, whichever is greater. The difference between duplicate and standard sample results will be compared with DEQ's precision requirements for *E. coli* and enterococci listed in the DEQ Data Quality Matrix, ver. 5.0. Any bacteria data generated by this project that appear anomalous will be discussed with the DEQ volunteer water quality monitoring coordinator. The coordinator will also be consulted if duplicate bacteria samples exceed the precision threshold more than once during each year of monitoring.

Salinity

Salinity Quality Control (QC) procedures will follow the procedures for specific conductivity outlined in the *Volunteer Monitoring Program QAPP* and the *Data Quality Matrix ver. 5.0*. The accuracy of the sonde's salinity/conductivity sensor will be measured before and after each sampling event using two separate conductivity solutions of 147 µS/cm and 1413 µS/cm. The difference between the sensor measurements and

the expected measurements will be compared with DEQ's accuracy requirements listed in the DEQ Data Quality Matrix, ver. 5.0.

The precision of the sonde's salinity/conductivity sensor will be measured by taking a duplicate measurement within 15ft and 15 minutes of the same location as a standard measurement. The number of duplicate measurements will be ≥10% of the standard measurements collected or one sample per field-sampling day, whichever is greater. This will result in at least three duplicate measurements being collected monthly. The precision of the standard and duplicate measurements will be compared with DEQ's precision requirements listed in the DEQ Data Quality Matrix, ver. 5.0. Salinity data generated by this project that appear anomalous will be discussed with the DEQ volunteer water quality monitoring coordinator. The coordinator will also be consulted if duplicate salinity samples exceed the precision threshold more than once during each year of monitoring.

Temperature

Temperature QC procedures will follow those outlined in DEQ's *Volunteer Monitoring Program QAPP*, *Continuous Water Monitoring Procedures*, and *Data Quality Matrix ver. 5.0*. The accuracy of temperature data loggers will be tested using cold and warm water baths before deployment and after retrieval. Any temperature data loggers that fail the accuracy test will not be used for monitoring.

Precision will be tested by collecting duplicate temperature samples at logger deployment, once during deployment, and at retrieval. A temperature probe traceable to the National Institute of Standards and Technology (NIST) will be used to collect duplicate temperature measurements. Temperature differences between temperature data loggers and corresponding duplicate samples will be compared with DEQ's precision requirements for continuous temperature monitoring listed in the DEQ Data Quality Matrix, ver. 5.0.

Upon download and compilation of data from the temperature data loggers, charts will be created and visually assessed to identify anomalous temperature patterns. If a monitoring site became dewatered over the summer and the temperature data logger was exposed to air, the pattern of data in the chart will visually differ from the pattern of data typically collected underwater. Other data anomalies like sudden spikes could be indicative of a faulty temperature logger or a dying battery. Any data anomalies found will be noted in the temperature monitoring database and communicated to DEQ upon submission of data.

2.6. Instrument/equipment testing, inspection, and maintenance requirements

The maintenance and inspection recommendations outlined in Table 9 of the *Volunteer Monitoring Program QAPP* will be followed.

2.7. Instrument calibration and frequency

Calibration of instruments will follow the frequency and standards outlined in table 10 from Section 2.7 of the *Volunteer Monitoring Program QAPP.*

2.8. Non-direct measurements

The storage and inspection of supplies and consumables will follow the guidelines in Table 11 of the *Volunteer Monitoring Program QAPP.*

2.9. Data management

Bacteria

Bacteria monitoring details will be recorded on a physical data sheet, which also serves as the COC form (see figure 3). Data sheets/COC forms will be stored in physical format at the Coos SWCD office and scanned and saved to a network server. Analysis data received from the laboratory will be organized in a Microsoft Excel spreadsheet. The data will be charted and compared with Oregon water quality limits on bacteria pollution.

The data will be checked by Coos SWCD staff for data anomalies or inconsistencies. Coos SWCD staff will contact the DEQ volunteer monitoring coordinator if any concerns with the data are identified. Data will be submitted to DEQ using the Grab Data Submittal form as outlined in the *Volunteer Monitoring Program QAPP*. Data submission to DEQ will occur in February following each year of monitoring. Coos SWCD staff will be responsible for the data at every step until submittal to DEQ.

Chain of Custody: Noble Creek Bacteria Monitoring									
Noble Creek Tide Direction and Level (In/Out, High/Low)					Precipitation Event (in./date):		Weather on sampling date:		
Sample ID	**Water Body**	**Latitude**	**Longitude**	**Site Description**	**Date of Collection**	**Time of Collection**	**Sampled by**	**Preservation Method**	**Notes**
NB1	Noble Creek	43.25619	-124.21556	Noble Creek Below Main Tidegate				Ice ≤4°C	
NB2	Noble Creek	43.25244	-124.21384	Noble Creek Below Bramble Lane Bridge				Ice ≤4°C	
NB3	Noble Creek	43.2525	-124.21415	Pasture Channel by Bramble Lane Bridge				Ice ≤4°C	
NB4	Noble Creek	43.25143	-124.20526	Noble Creek by Spruce Trees				Ice ≤4°C	
NB5	Noble Creek	43.2521	-124.19925	Noble Creek Above Ferry Creek				Ice ≤4°C	
Duplicate:	Noble Creek							Ice ≤4°C	
Blank	N/A	N/A	N/A	N/A				Ice ≤4°C	
Transfer Date:			**Transfer Time:**						
Signature of Sample Collector:					**Signature of Recipient:**				

Figure 3. Chain of Custody form/data sheet for bacteria monitoring

Salinity

Salinity measurements will be recorded electronically on a digital tablet that is connected to a sonde via Bluetooth®. The measurements will also be transcribed to a physical data sheet for redundancy in case of electronic issues (see figure 4). Upon return to the office, the data files will be transferred from the tablet to the Coos SWCD server and the data will be manually entered into a Microsoft Excel spreadsheet. Datasheets will also be scanned and stored on Coos SWCD's network server.

The data will be checked by Coos SWCD staff for data anomalies or inconsistencies. Coos SWCD staff will contact the DEQ volunteer monitoring coordinator if any concerns with the data are identified. Data will be submitted to DEQ using the Grab Data Submittal form as outlined in the *Volunteer Monitoring Program QAPP*. Data submission to DEQ will occur in February following each year of monitoring. Coos SWCD staff will be responsible for the data at every step until submittal to DEQ.

Repeated measures correlation will be used to compare salinity with *E. coli* and enterococci concentrations to determine if a significant relationship is present with either parameter.

Chain of Custody: Noble Creek Salinity Monitoring									
Noble Creek Tide Direction and Level (In/Out, High/Low)					**Precipitation Event (in./date):**		**Weather on sampling date:**		
Sample ID	**Water Body**	**Latitude**	**Longitude**	**Site Description**	**Date of Collection**	**Time of Collection**	**Sampled by**	**Preservation Method**	**Notes**
NS1	Noble Creek	43.25619	-124.21556	Noble Creek Below Main Tidegate				Ice ≤4°C	
NS2	Noble Creek	43.25244	-124.21384	Noble Creek Below Bramble Lane Bridge				Ice ≤4°C	
NS3	Noble Creek	43.2525	-124.21415	Pasture Channel by Bramble Lane Bridge				Ice ≤4°C	
NS4	Noble Creek	43.25143	-124.20526	Noble Creek by Spruce Trees				Ice ≤4°C	
NS5	Noble Creek	43.2521	-124.19925	Noble Creek Above Ferry Creek				Ice ≤4°C	
Duplicate:	Noble Creek							Ice ≤4°C	
Blank	N/A	N/A	N/A	N/A				Ice ≤4°C	
Transfer Date:			**Transfer Time:**						
Signature of Sample Collector:					**Signature of Recipient:**				

Figure 4. Data sheet for salinity monitoring

Temperature

Details of the deployment, QC auditing, and retrieval of temperature data loggers will be recorded by Coos SWCD staff on a datasheet (see figure 5). The physical datasheets will be stored at the Coos SWCD office. Datasheets will also be scanned and stored on Coos SWCD's network server.

Data will be downloaded from the Onset® Hobo® U22-001 temperature data loggers using the Hoboware® Pro software program. The data will then be exported to a Microsoft Excel® spreadsheet. Either Hoboware® Pro or Microsoft Excel will be used to analyze the temperature data for exceedances of critical thresholds for the survival of salmonids according to Oregon Administrative Rule (OAR) 340-041-0028. For each site, the seven-day moving average of the daily maximum temperature will be calculated. Charts and tables will be created that exhibit trends in the data and exceedances of temperature thresholds for salmonid survival. Charts of the downloaded data will be visually reviewed by Coos SWCD staff to ensure that measurements are within expected temperature ranges and patterns. If any measurement anomalies like sudden spikes in temperature or gradually decreasing temperatures throughout the season, we will contact the DEQ volunteer monitoring coordinator for advice. This procedure could identify problems that affect data quality like a dying battery on a data logger or a stream site drying up mid-summer.

Data will be submitted to DEQ using their Continuous Data Submittal form according to the methods described in the *Volunteer Monitoring Program QAPP*. Raw data will not be clipped or edited prior to submittal to DEQ. The locations of monitoring sites will be recorded in the submittal form, along with the datum used. Data submission will occur in February following each year of monitoring. Coos SWCD staff will be responsible for the data at every step until submittal to DEQ.

Noble Creek Temperature Monitoring Datasheet										
Monitoring Team Members:										
Site	**Logger ID**	**Coordinates**	**Details**	**Equivalent E. coli Site**	**Date**	**Time**	**Temp (C)**	**Deployed?**	**Retrieved?**	**Notes**
NT1		43.256854, -124.215440	Isthmus Slough Below Main Tidegate	NB1 just upstream						
NT2		43.25244, -124.21384	Noble Creek Below Bramble Lane Bridge	NB2						
NT3		43.252498, -124.214149	Pasture Channel by Bramble Lane Bridge	NB3						
NT4		43.25143, -124.20526	Noble Creek by Spruce Trees	NB4						
NT5		43.252104, -124.199246	Noble Creek Above Ferry Creek	NB5						

Figure 5. Data sheet for temperature monitoring

3. Assessment and Oversight

Project assessment and oversight, including field activities, will be the responsibility of the project manager.

3.1. Assessment and response actions

Coos SWCD will follow the assessment and response procedures outlined in the *Volunteer Monitoring Program QAPP*. The results of QC procedures for accuracy and precision, according to the DEQ *Data Quality Matrix ver. 5.0*, will be used by the project manager to assign a data quality level after each survey event. If A-level criteria are not reached at any time, the project manager will review the monitoring design, data collection, and QC procedures. If data quality consistently does not reach A-level quality, the project manager will consult with the DEQ volunteer monitoring coordinator. Data assigned level C or below will not be used by the project.

Data Quality Level	Quality Assurance Plan	Water Temperature Methods	pH Methods	Dissolved Oxygen Methods	Turbidity Methods	Conductivity Methods	Bacteria Methods	Data Uses
A	Approved QAPP	Thermometer Accuracy checked with NIST standards A ≤ ± 0.5°C P ≤ ± 0.5°C	Calibrated pH electrode A ≤ ± 0.2 S.U. P ≤ ± 0.3 S.U.	Winkler titration A ≤ ± 0.2 mgL P ≤ ± 0.3 mgL Calibrated oxygen meter/LDO Accuracy: ≤ + 0.4 mgL ≥ - 0.3 mgL P ≤ ± 0.3 mgL	Nephelometric Turbidity meter A ≤ ± 10% Standard value P ≤ ± 20% (± 3 NTU if NTU < 20)	Meter with temp correction to 25°C A ≤ ± 7% of standard value P ≤ ± 10%	DEQ Approved Methods Absolute difference between log-transformed values P ≤ 0.6 log	Regulatory, permitting, compliance (e.g., 303(d) and 305(b) assessments)
B	Minimum Data Acceptance Criteria Met	Thermometer Accuracy checked with NIST standards A ≤ ± 1.0°C P ≤ ± 2.0°C	Any Method A ≤ ± 0.5 S.U. P ≤ ± 0.5 S.U.	Winkler titration or Calibrated oxygen meter/LDO A ≤ ± 1 mgL P ≤ ± 1 mgL	Any Method A ≤ ± 30% P ≤ ± 30%	Meter with temp correction to 25°C A ≤ ± 10% of standard value P ≤ ± 15%	DEQ Approved Methods Absolute difference between log-transformed values P ≤ 0.8 log	Regulatory, permitting, compliance (e.g., 303(d) and 305(b) assessments) with professional judgment
C		A > ± 1.0°C P > ± 2.0°C	A > ± 0.5 S.U. P > ± 0.5 S.U.	A > ± 2 mgL P > ± 2 mgL	A > 30% P > 30%	A > ± 10% P > ± 15%	Absolute difference between log-transformed values P > 0.8 log	**Not to used for 303(d) and 305(b) assessments** Based on project manager judgment, the data may be **Voided** with a DQL of D.
D		Missing or voided data	Missing or voided data	Missing or voided data	Missing or voided data	Missing or voided data	Missing or voided data	Missing or voided data
E	No QAPP provided	No precision or accuracy checks available	Any Method No precision or accuracy checks available	Any Method No precision or accuracy checks available	Any Method No precision or accuracy checks available	Meter without routine calibration No precision or accuracy checks available	Any Method No precision or accuracy checks available	Informational purposes only
F	See definitions table	See definitions table	See definitions table	See definitions table	See definitions table	See definitions table	See definitions table	See definitions table

Figure 6. Data Validation Criteria for Water Quality Parameters Measured in the Field (DEQ 2013)

3.2. Reports to management

The results of quality control tests will be submitted to DEQ every February alongside data submissions. Any results that cannot be included in the grab monitoring and continuous monitoring data submission forms will be emailed to the DEQ volunteer monitoring coordinator.

4. Data validation and usability

Data quality levels (DQL) will be assigned in accordance to DEQ guidance document *Data Validation and Qualification* (DEQ09-LAB-0006-QAG). Generally, only targeted DQLs of “A”, or “B” will be acceptable unless the basis for the data acceptability is approved and documented by the project manager and DEQ Volunteer Monitoring Coordinator. All data verification, validation, and assessment activities for project purposes are the responsibility of the project manager.

4.1. Data review, validation, and verification

Coos SWCD will follow the data review, validation and verification process outlined in section 4.1 of the *Volunteer Monitoring Program QAPP.*

4.2. Validation and verification methods

The validation and verification procedures used by Coos SWCD will follow section 4.2 of the *Volunteer Monitoring Program QAPP.*

4.3. Reconciliation with data quality objectives

Reconciliation with data quality objectives will follow the guidelines in section 4.3 of the *Volunteer Monitoring Program QAPP.*

5. Revision History

Revision History will track revisions that occur after the first approved version of the SAP.

Table 8 Revision History

Revision	Date	Changes	Editor
1.0	2/2/2024	New document	Andrew Chione