Water Quality Division

Mercury Follow-up Workshop

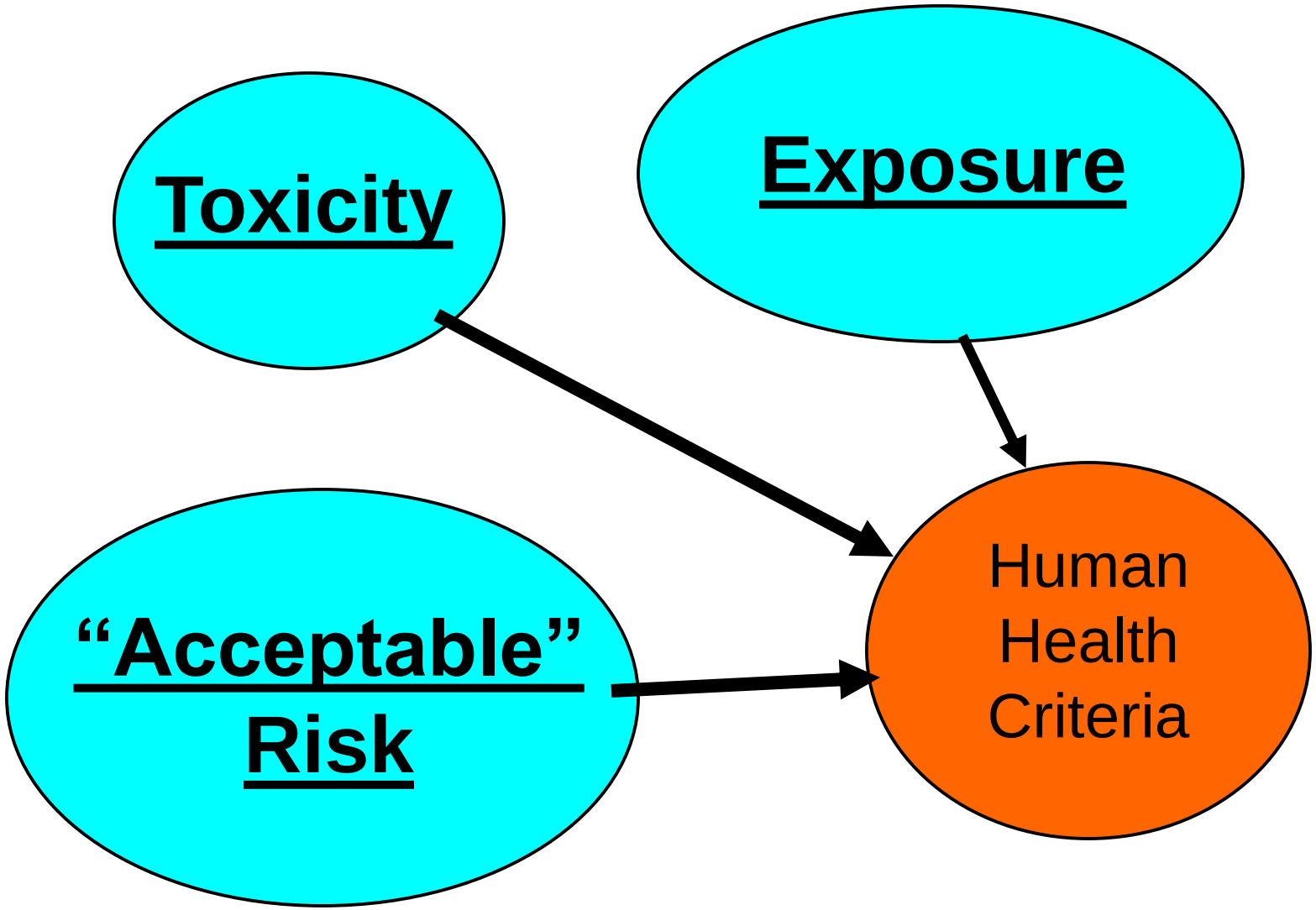
January 25, 2019
Corvallis, OR

Workshop Topic Categories

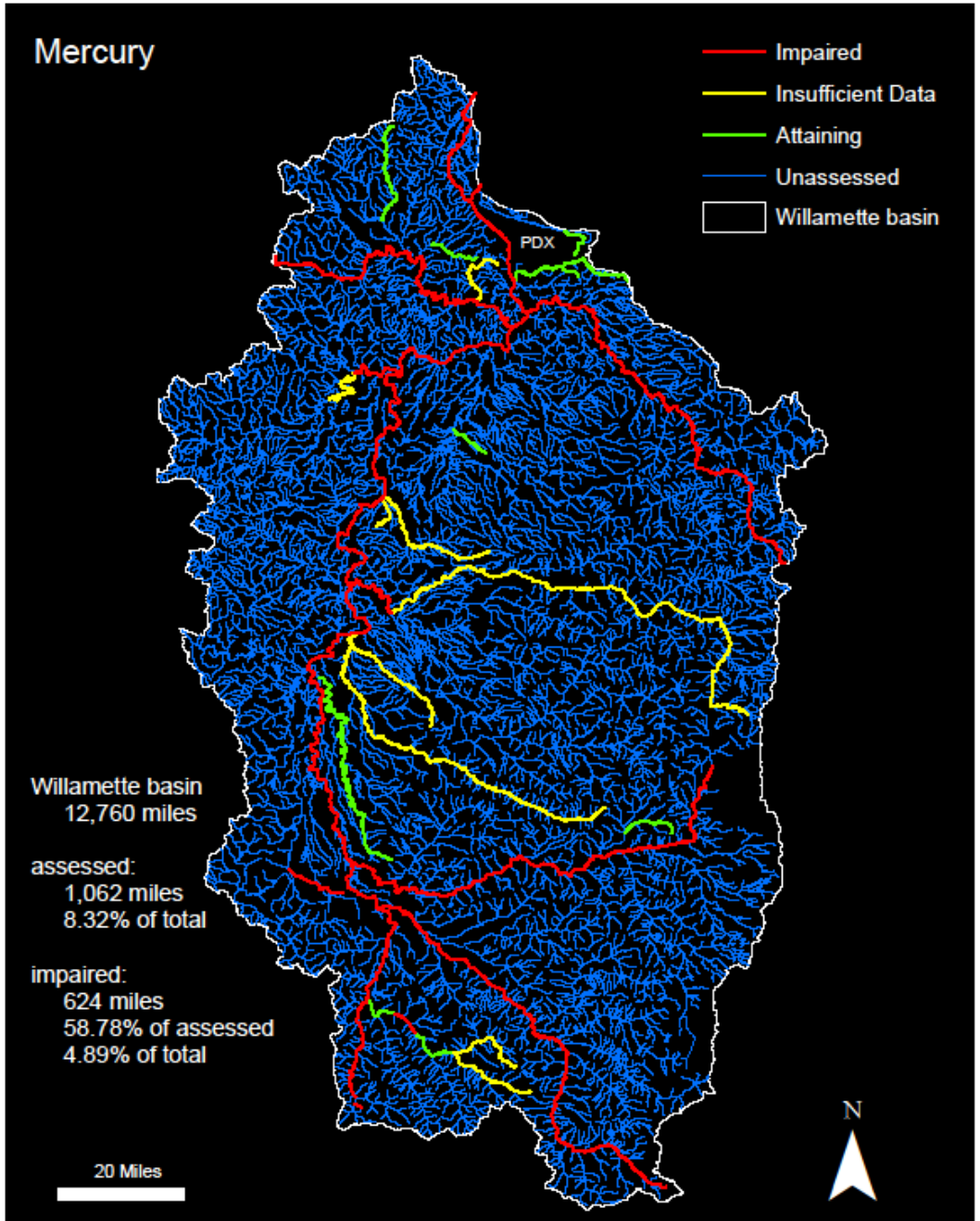
- Mercury water quality criteria derivation & application
- Willamette Basin Mercury TMDL key process information
- Implementation of Willamette Basin Mercury TMDL
- Practical outcomes

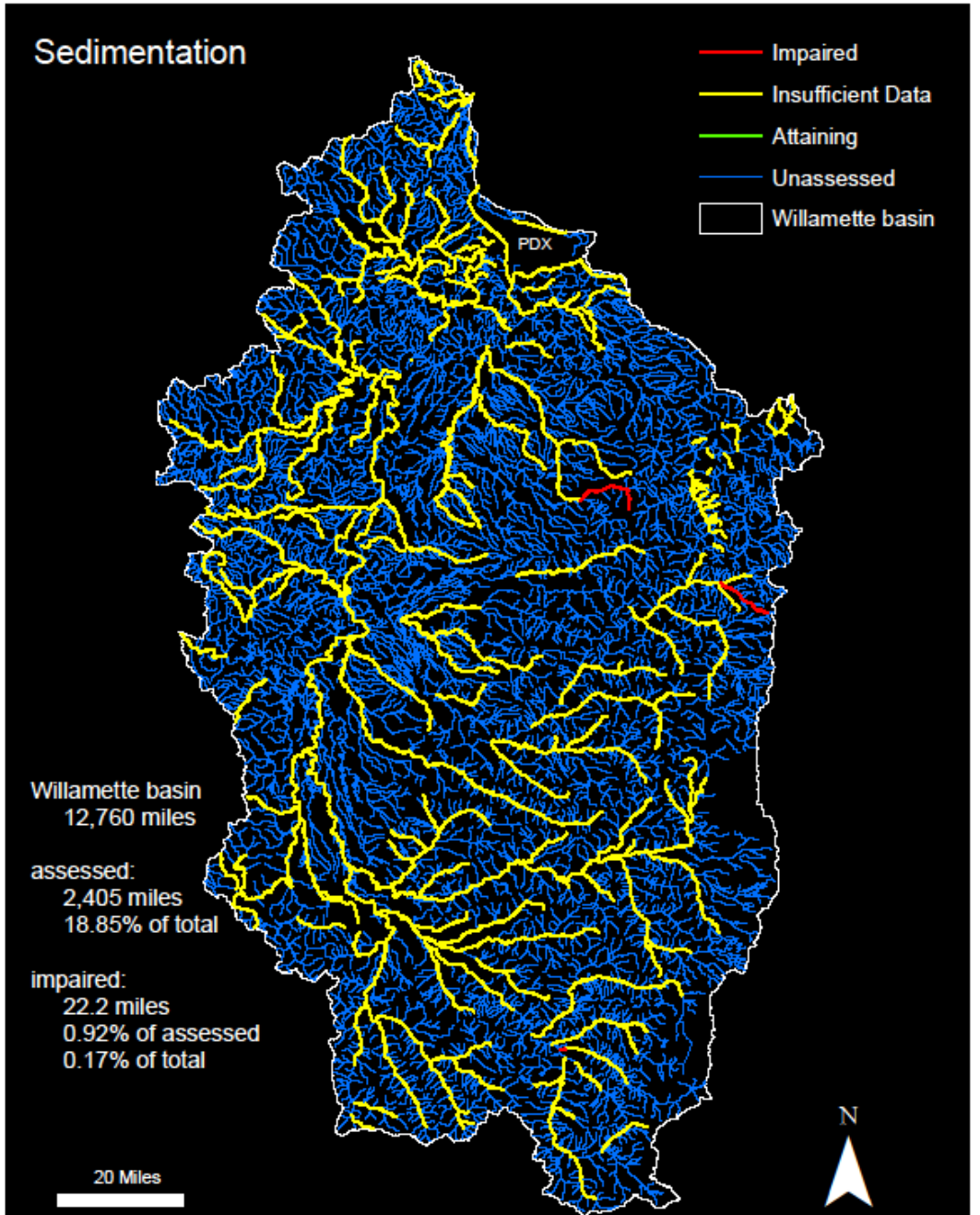
DEQ
State of Oregon
Department of
Environmental
Quality

What goes into human health criteria?



Willamette Basin Stream Impairments





DEQ
State of Oregon
Department of
Environmental
Quality

Fish Considerations in TMDL

- Food Web Model is tuned to fit the observed distribution of THg in 8 fish species

Biomagnification Factors

+

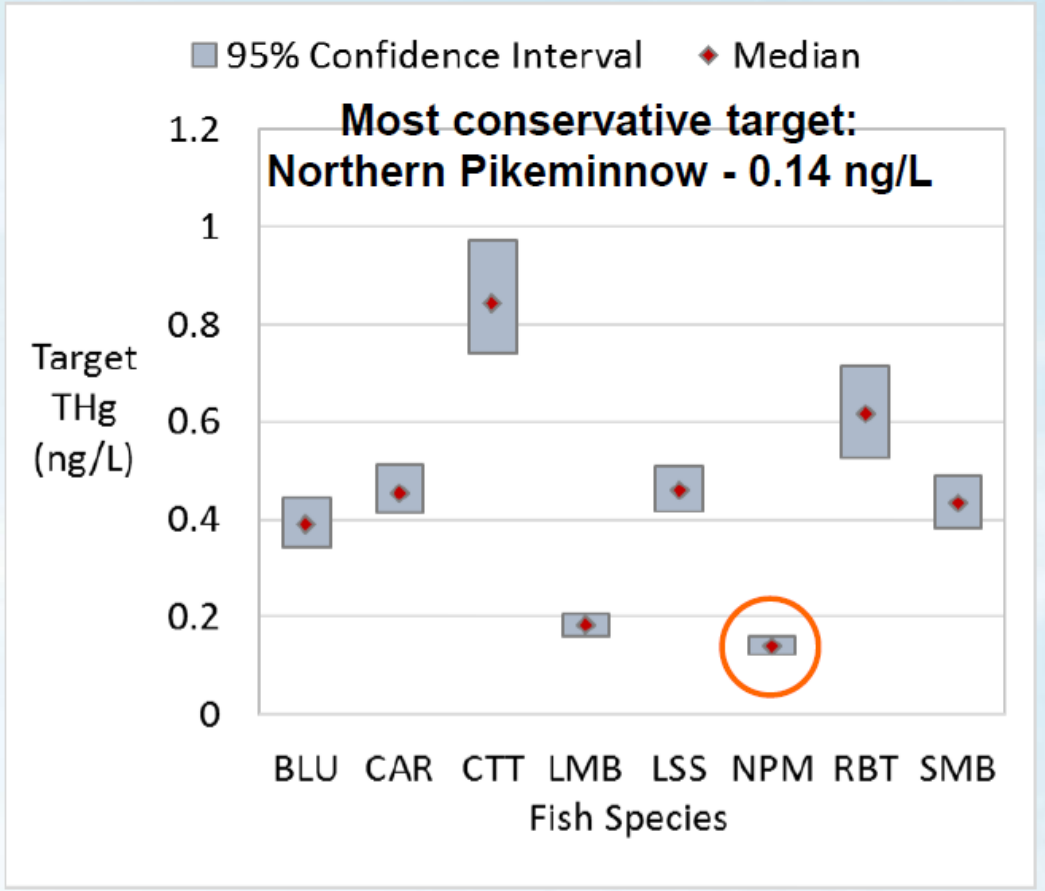
Revised Fish Tissue Criterion

+

Mercury Translator

→ Water Column THg Targets

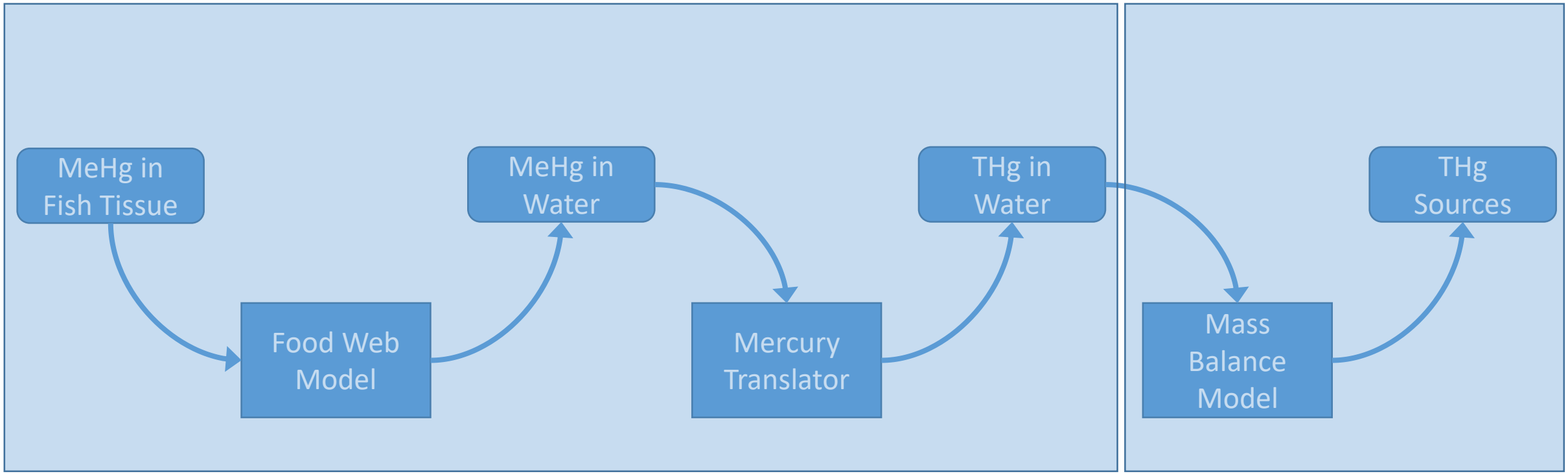
At a median concentration of 0.14 ng/L THg, the median northern pikeminnow will meet the 0.040 mg/kg wet weight tissue criterion



Slide courtesy of TetraTech

DEQ State of Oregon Department of Environmental Quality

Mercury Modeling Approach and TMDL Loads



Load Capacity

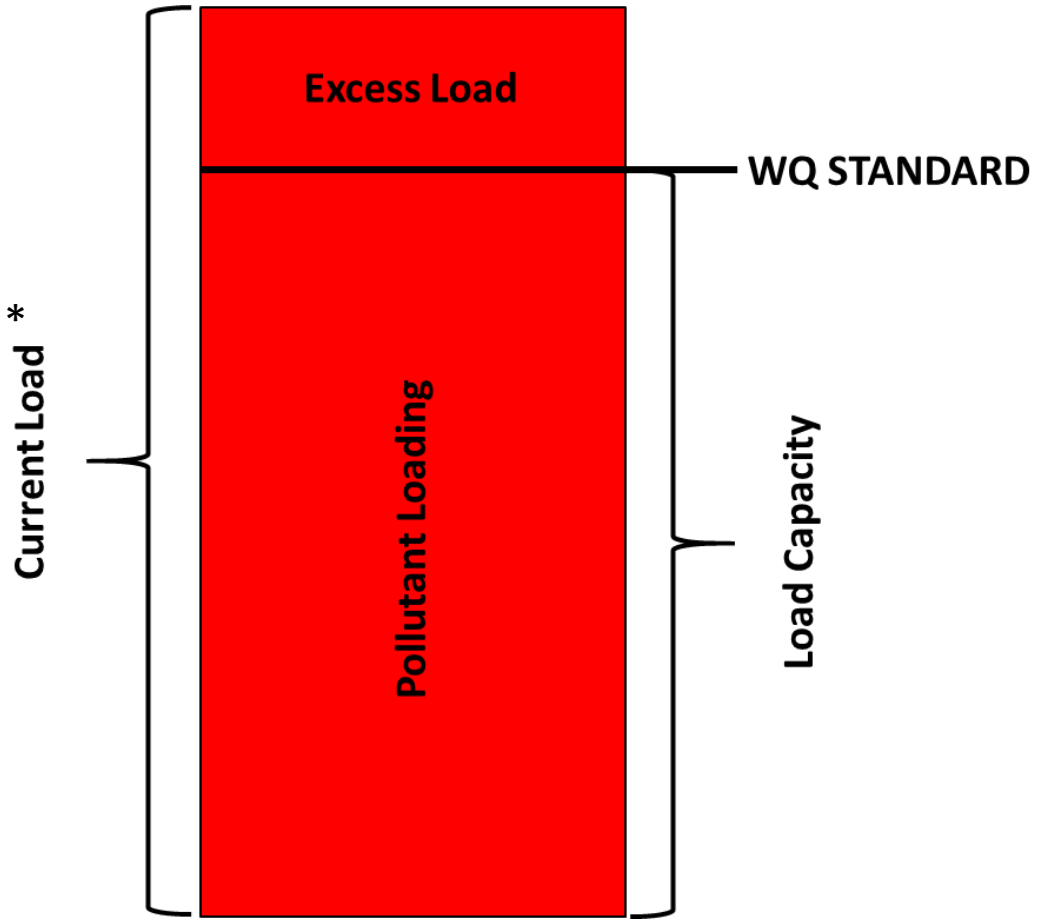
Link to Sources

Legend

Forms of Mercury (Hg)
MeHg – methylmercury
THg – total mercury

Model component

TMDL Loads



*Typical concept image. Not representative of actual Willamette Hg loads.

- **Current Load** - Estimated from Observed Total Hg Concentrations
- **Load Capacity** – Total Hg estimated using Food Web Model and Translator for fish species tissue concentration at WQ Standard
- **Excess Load** – expressed as percent reduction using formula

$$\%\ Reduction = \left(1 - \frac{Load\ Capacity}{Current\ Load}\right) \times 100$$

DEQ
State of Oregon
Department of
Environmental
Quality

Mass Balance Model

Urbanization

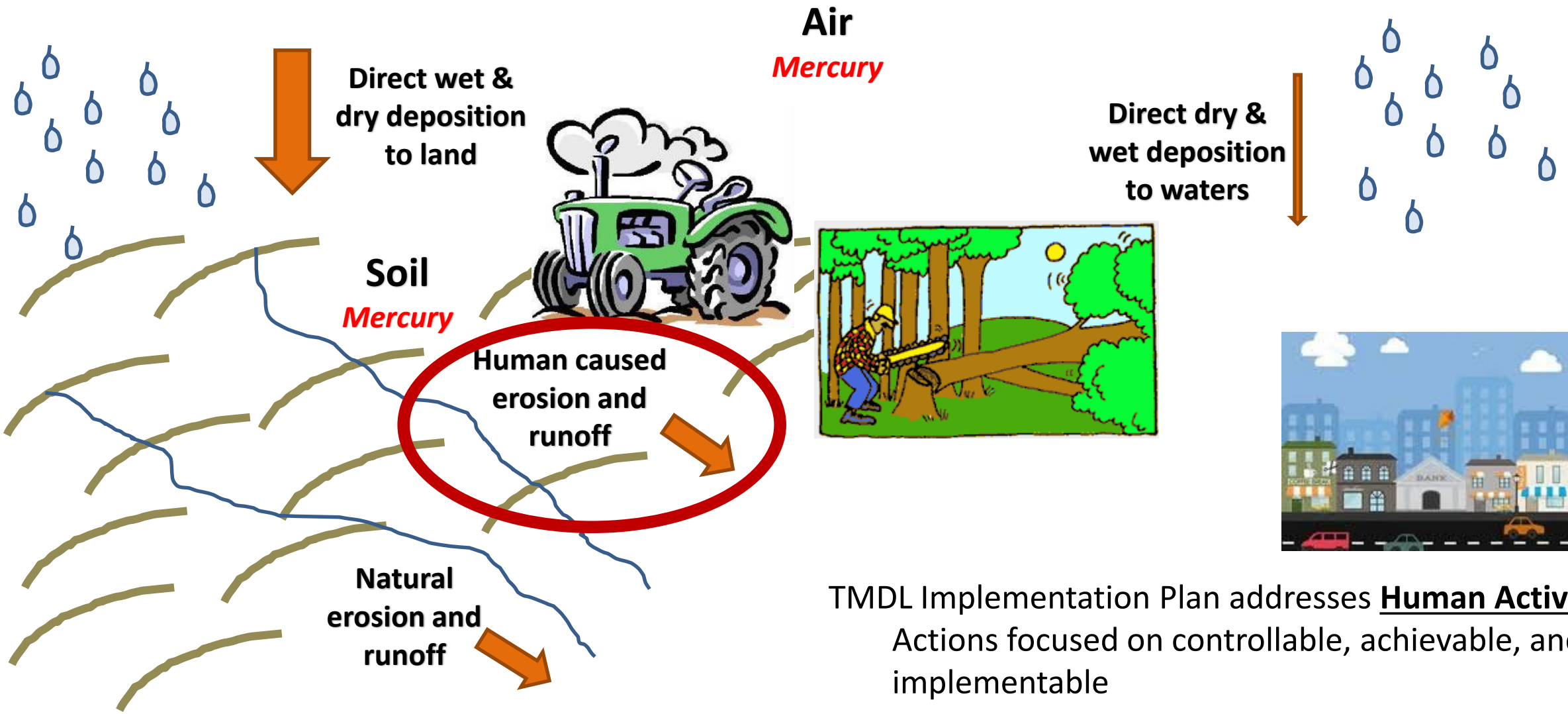
Forestry

Agriculture

- Mass Balance/Watershed Model
  - Spatially Distributed across sub-basins
  - Hourly-time step over multiple decades
- Nonpoint Sources
  - Runoff and groundwater
  - Soil erosion
- Point Sources
  - POTW and Industrial
  - MS4
- Reservoir Management
- Mines
- Detailed THg Source Characterization

DEQ
State of Oregon
Department of
Environmental
Quality

Willamette Basin Mercury Sources and Movement to Waterbodies

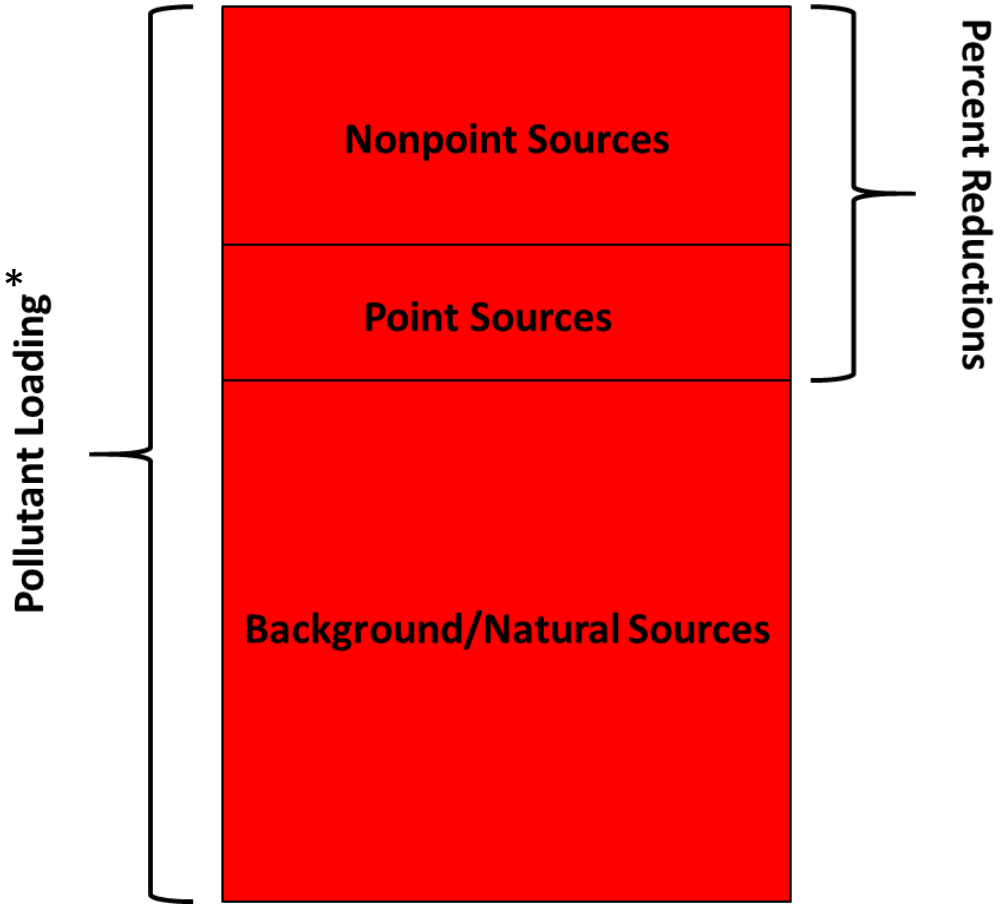


TMDL Implementation Plan addresses **Human Activities**

Actions focused on controllable, achievable, and implementable

DEQ
State of Oregon Department of Environmental Quality

TMDL Allocations

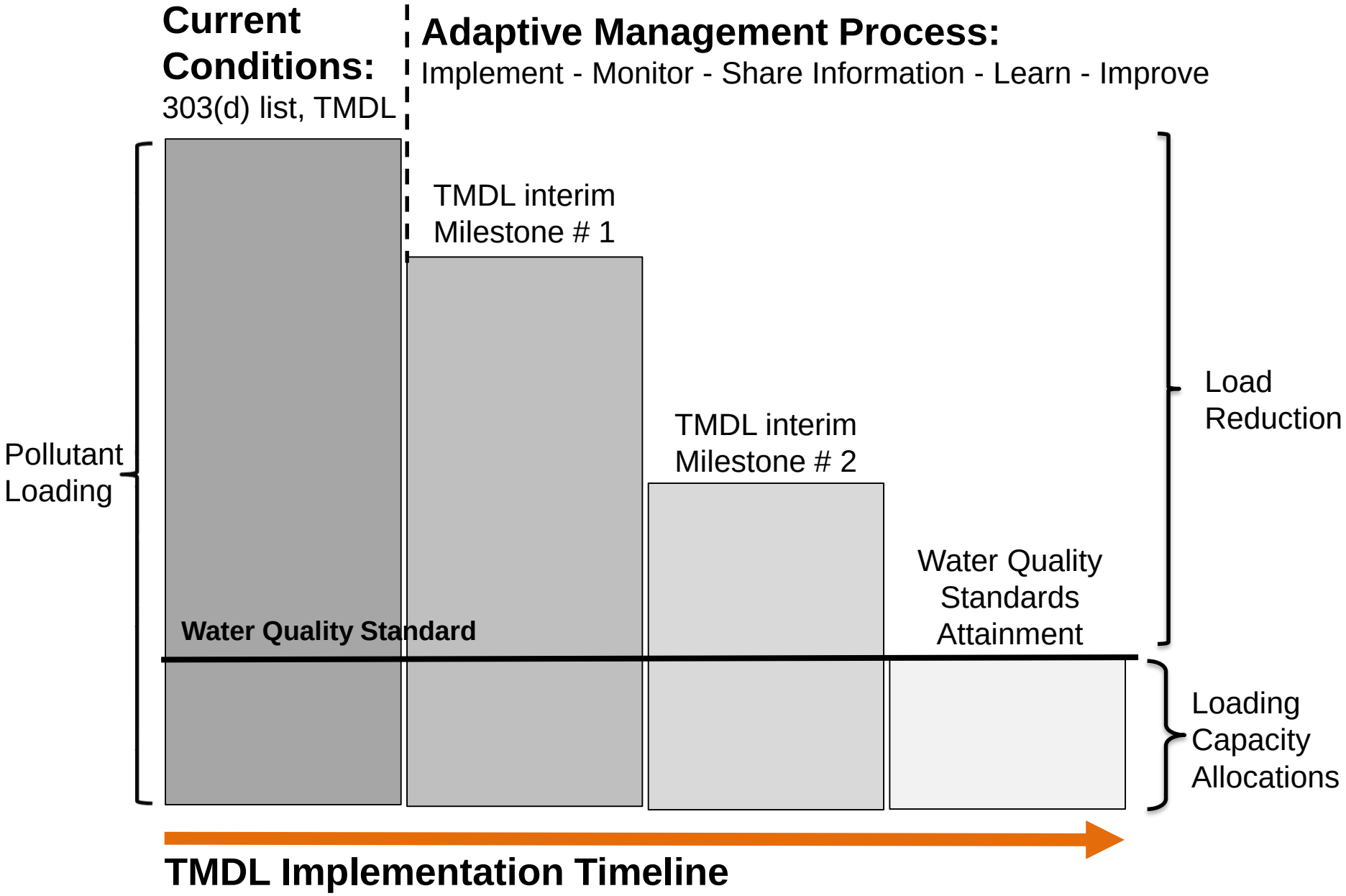


*Typical concept image. Not representative of actual Willamette Hg loads.

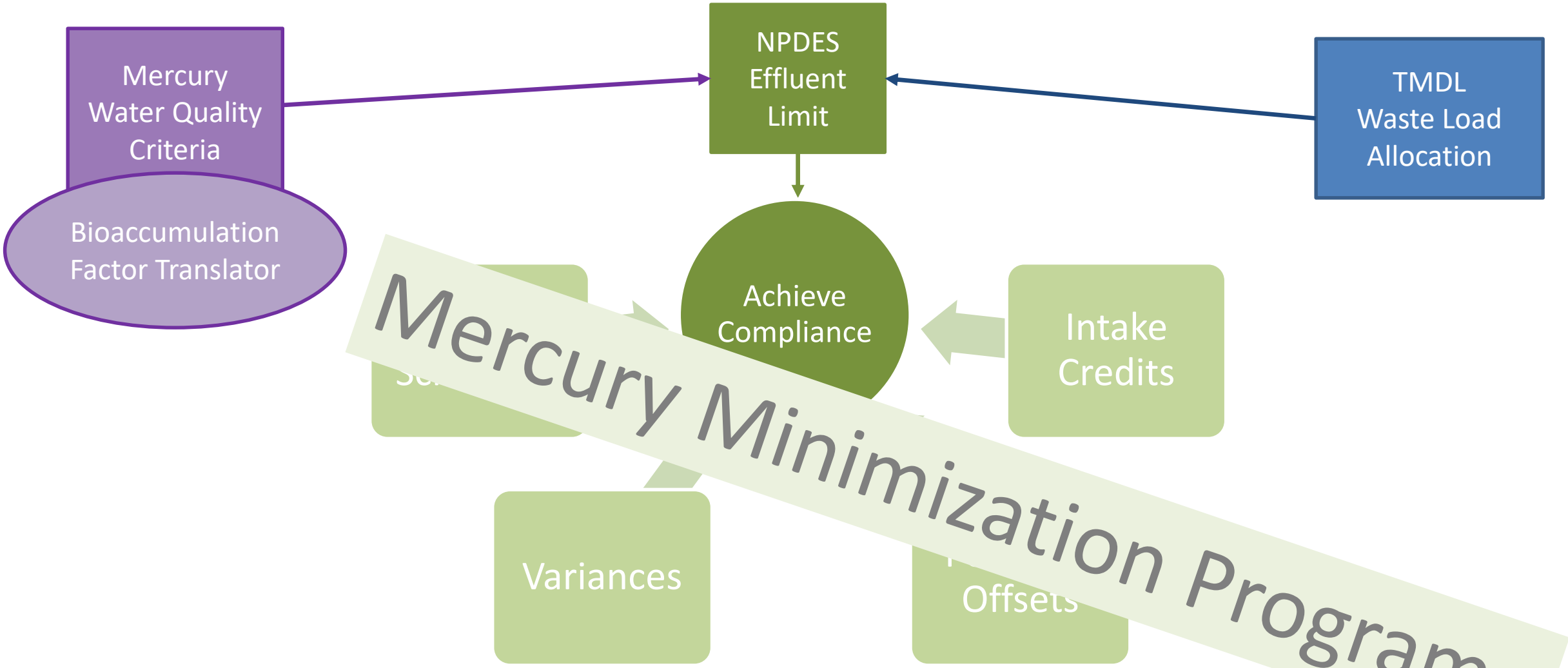
- **Excess Load**
  - Includes only anthropogenic point and nonpoint sources
  - Expressed as percent reduction for Willamette River Basin Hg TMDL
- **Mass Balance Model**
  - Links the sources to the THg in river system
  - Used to test allocation scenarios for different source reductions

DEQ
State of Oregon
Department of
Environmental
Quality

Willamette Mercury TMDL Timeline



Potential NPDES Tools



Are there technological fixes?

Point Sources

TREATMENT TECHNOLOGY	VOLUME RANGE OF KNOWN USES	TREATMENT ABILITY
Activated sludge	Up to 25 MGD	3-50 ng/L
Activated sludge w/ Nutrient Removal & Filtration	Up to 25 MGD	1-10 ng/L
Membrane Filtration	Low volume	Bench scale to 0.26 ng/L
Ion Exchange	0.015 MGD (5-50 GPM)	1 ng/L
Precipitation and filtration	Low volume	Bench scale to 0.17 ng/l
Adsorption	Low volume	Bench scale to 0.08 ng/l

No technologies demonstrated effective to < 1 ng/L at POTW scale

Nonpoint Sources

- Focus is low tech erosion and runoff prevention methods
- Air emissions reduction technologies and statewide reduction and remediation efforts

DEQ
State of Oregon Department of Environmental Quality

Re ffer, but co
of effective to
m g in stormw

Figure 1. Newly installed planting along Newton creek, Benton County, Oregon.

Photo by Donna Schmitz, Benton Soil and Water Conservation District.

Forestry Lands Appro

BLM
- Mulching

US Forest Service
- Road & Trail location & design
- Construction & reconstruction
- Operations & maintenance
- Stream crossings
- Storm damage surveys

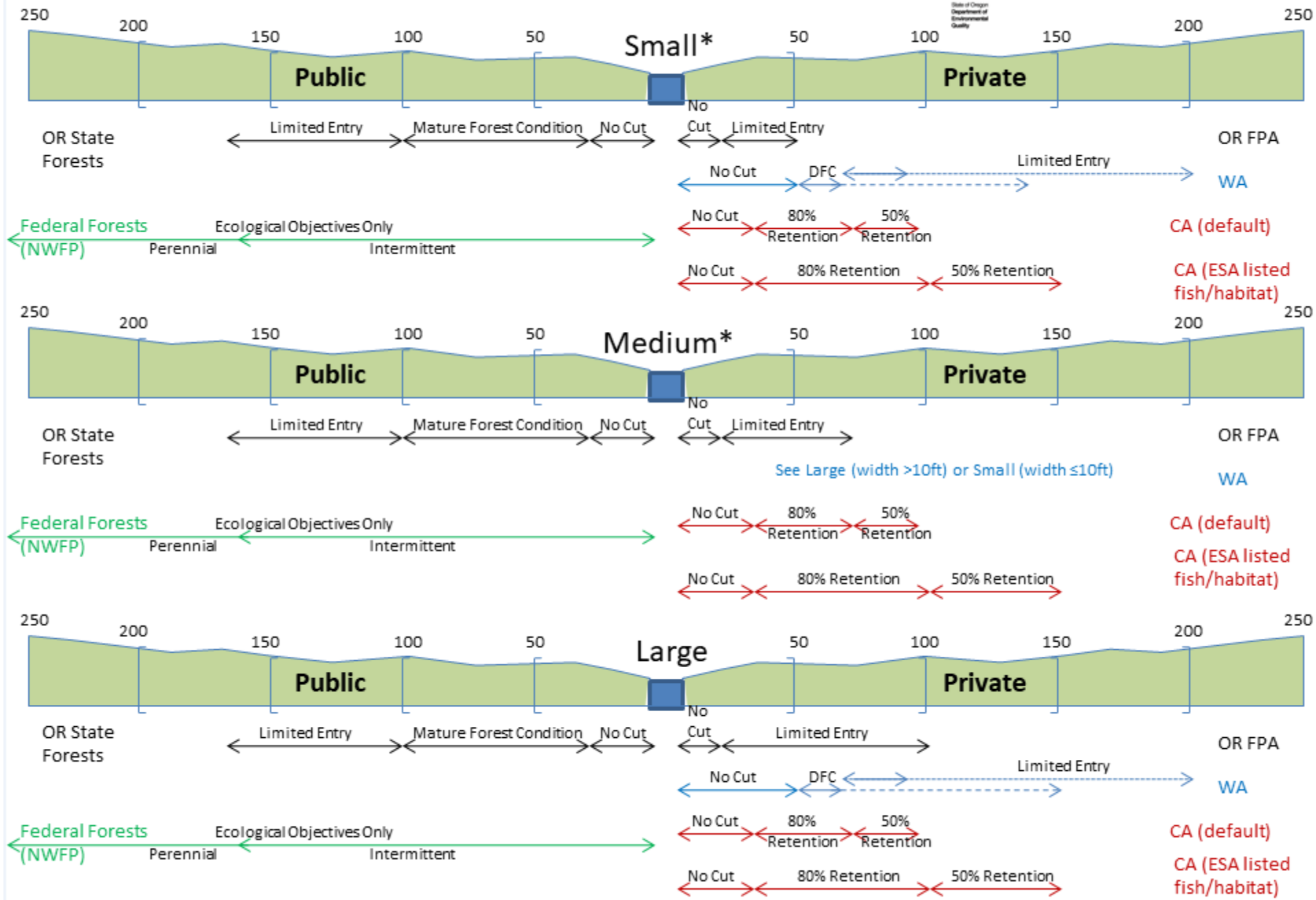
ODF Forest Practices Act Rules
- Road construction & maintenance
- Harvesting
- Landslides
- Water Protection
- Reforestation

DEQ
State of Oregon Department of Environmental Quality

Western Oregon Fish-Bearing Streams

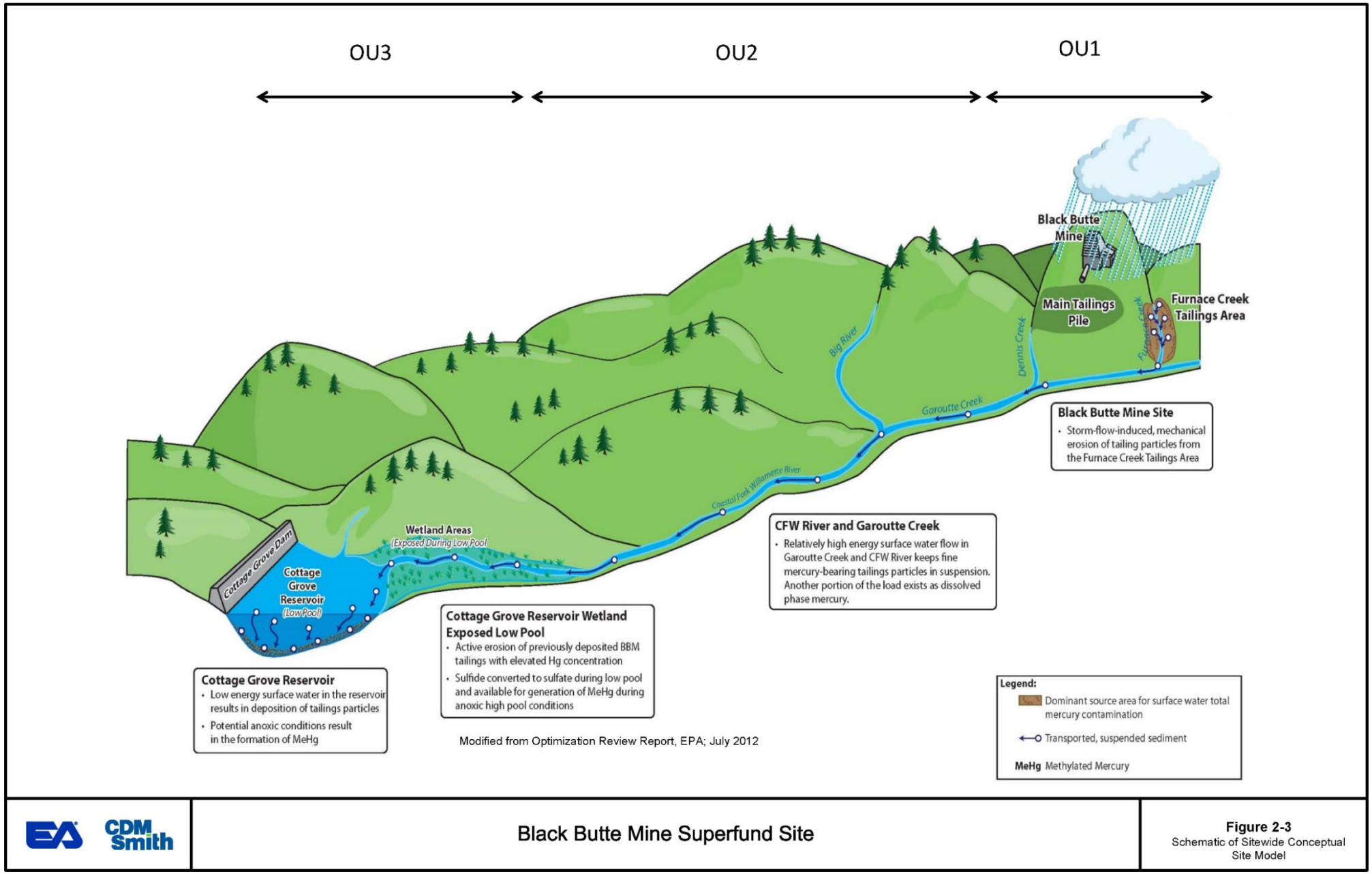
Units =Feet

DFC=Desired Future Condition



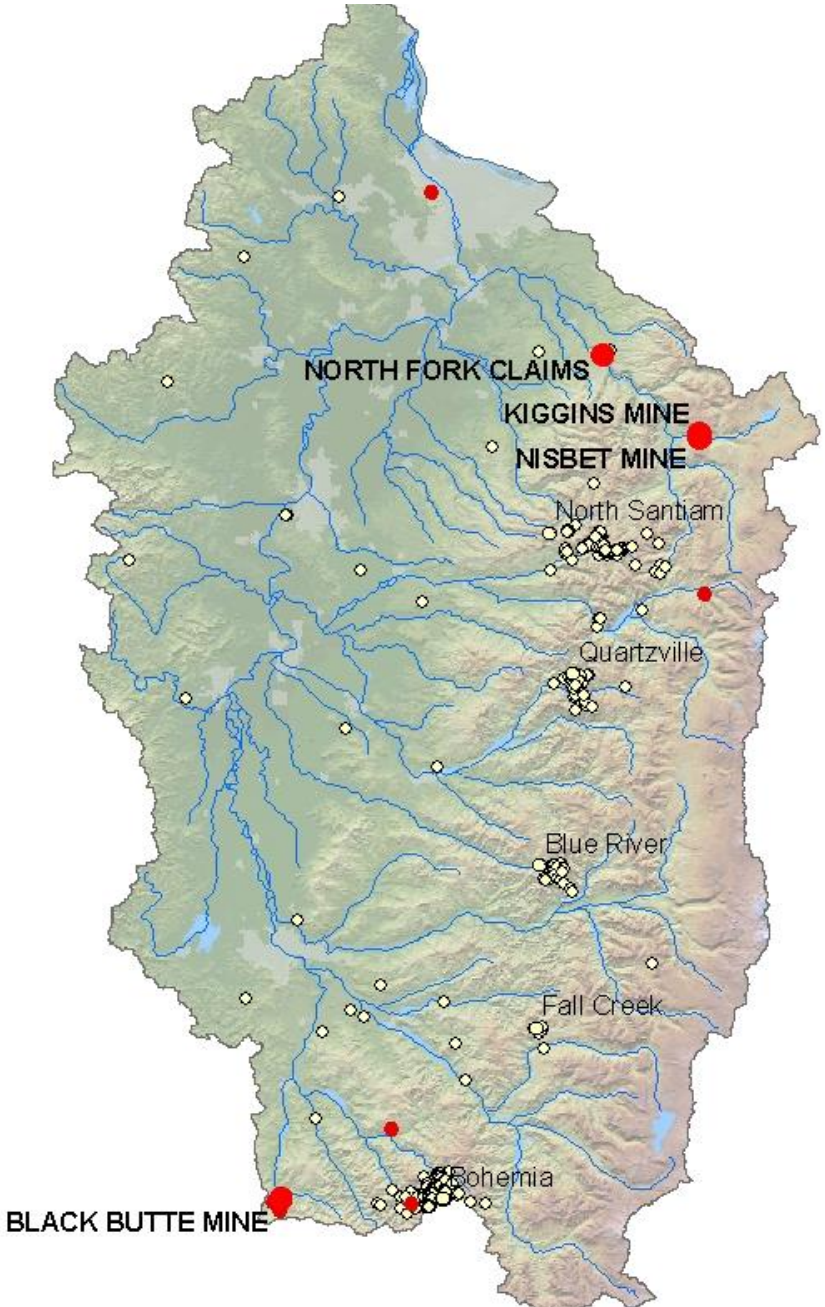
9/28/2017 *2017 rule changes for small & medium Salmon, Steelhead, & Bull Trout streams increased protections by 10ft for that stream subset

Black Butte Mine Superfund Site



DEQ
State of Oregon Department of Environmental Quality

Abandoned Mine Lands in the Willamette Basin



5 Abandoned Mercury Mines

- Black Butte Mine – 16000 flasks total production
- Nisbet – 102 flasks total production
- Kiggins – 71 flasks total production
- Ames-Bancroft – 7 flasks total production
- North Fork Claims – no production

7 Mercury Prospects (no extraction or production)

500 Heavy Metal (non-Hg) Abandoned Sites

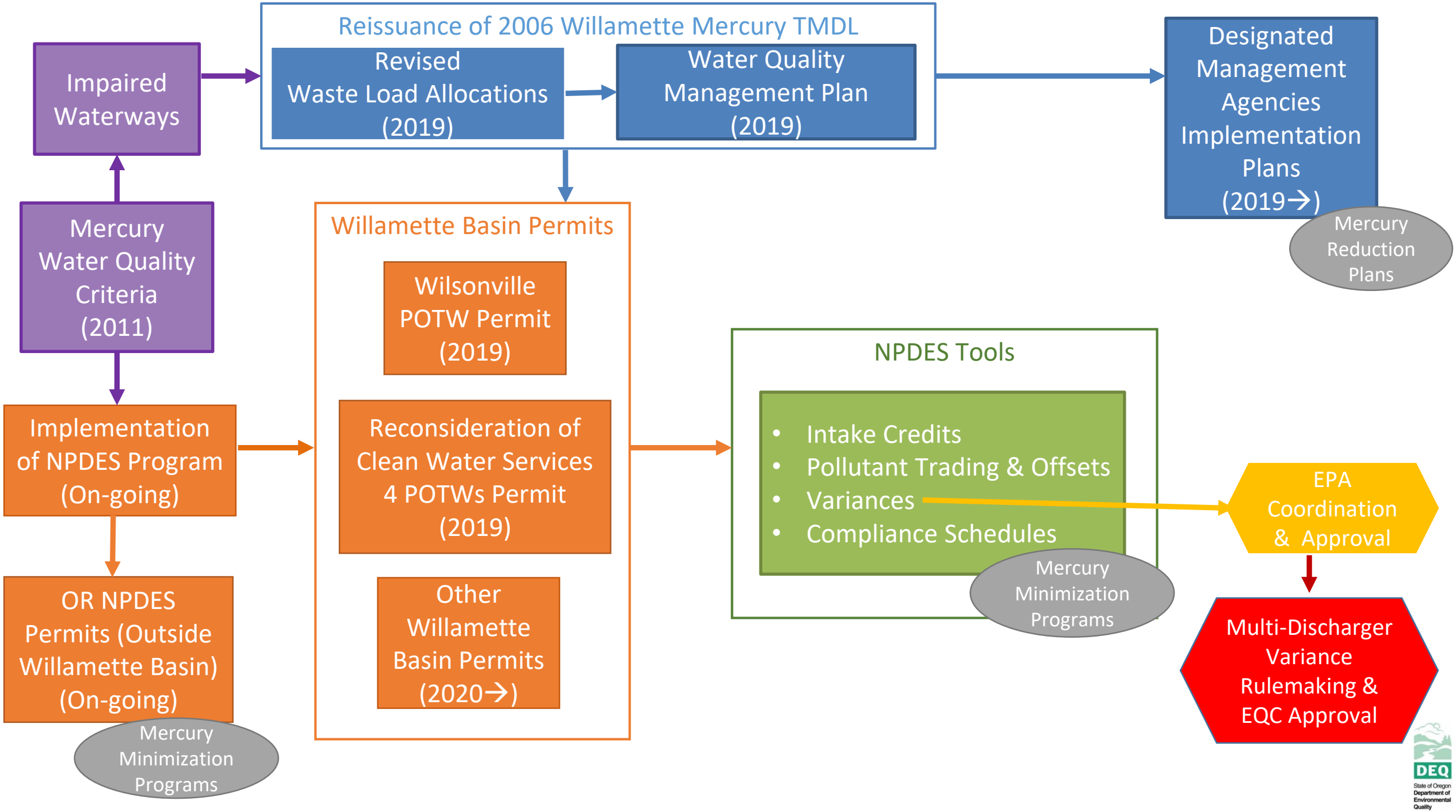
- Most are prospects or had limited production
- Most are in Forest Service Jurisdiction (un-patented claims)

5 Main Districts Focused on Gold with Potential Historic Amalgamation

- Bohemia – most significant with Hg impacts to Dorena
  - 6 sites needing additional assessment/cleanup
- North Santiam – somewhat significant
  - 2 sites needing additional assessment/cleanup

There may be several Federal sites requiring additional work, but they are not likely large.

DEQ
State of Oregon Department of Environmental Quality


Impaired Waterways
Reissuance of 2006 Willamette Mercury TMDL
Revised Waste Load Allocations (2019)
Water Quality Management Plan (2019)
Designated Management Agencies Implementation Plans (2019→)
Mercury Reduction Plans
Mercury Water Quality Criteria (2011)
Willamette Basin Permits
Wilsonville POTW Permit (2019)
Implementation of NPDES Program (On-going)
Reconsideration of Clean Water Services 4 POTWs Permit (2019)
NPDES Tools
Intake Credits
Pollutant Trading & Offsets
Variances
Compliance Schedules
Mercury Minimization Programs
EPA Coordination & Approval
Other Willamette Basin Permits (2020→)
OR NPDES Permits (Outside Willamette Basin) (On-going)
Mercury Minimization Programs
Multi-Discharger Variance Rulemaking & EQC Approval
DEQ
State of Oregon Department of Environmental Quality

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us.

DEQ
State of Oregon
Department of
Environmental
Quality