Oregon Department of Environmental Quality
Jan. 7-8, 2015
Oregon Environmental Quality Commission meeting
Rulemaking Action Item

Water Quality Standards Revisions for Freshwater Ammonia Criteria

DEQ recommendation to the EQC

DEQ recommends that the Environmental Quality Commission:

Adopt the proposed rules in Attachment A as part of chapter 340 of the Oregon Administrative Rules.

Overview

Short summary

The proposed rule amendments will:

- Adopt U.S. Environmental Protection Agency's latest 2013 national recommendations for freshwater ammonia criteria, which:
  - Are less stringent than Oregon's current chronic criteria for ammonia,
  - Are generally more stringent than Oregon's acute criteria for ammonia, and
  - Account for mussel and snail sensitivity to ammonia.

- Likely address EPA's Jan. 31, 2013, disapproval of Oregon's ammonia criteria, which the EQC adopted in 2004.

  The National Marine Fisheries Service's Biological Opinion indicated that Oregon's 2004 adopted ammonia criteria would cause jeopardy to threatened and endangered species. EPA and NMFS are evaluating how EPA's latest 2013 recommendations are consistent with the Reasonable and Prudent Alternatives in NMFS's jeopardy opinion. If NMFS determines that EPA's criteria derivation method generally followed the Reasonable and Prudent Alternatives, then NMFS can conclude that EPA's 2013 ammonia criteria protect threatened and endangered species in Oregon, thus satisfying Endangered Species Act consultation requirements. A "no jeopardy" decision from NMFS would likely lead to EPA approval of Oregon's proposed ammonia criteria.

- Correct an error in the stated applicability of the pH standard for the main stem Snake River.

- Amend the Umatilla Basin-specific standards and uses and remove a term from the definitions section to be consistent with EPA's partial disapproval of DEQ's site-specific criteria and use designations for the West Division Main Canal.

- Incorporate plain language into the amended rules consistent with the Oregon Administrative Procedures Act.

In addition, DEQ will add a note below two rule sections to notify the reader that EPA disapproved the statewide natural conditions criterion in OAR 340-041-0007(2) and the natural conditions criterion for temperature in OAR-340-041-0028(8). This means that these provisions may not be applied for Clean Water Act purposes, such as wastewater discharge permits or total maximum daily loads. DEQ did not accept public comments on the notes because they only provide information and do not amend the rule.

Brief history

Currently, Oregon's ammonia criteria are based on 1985 EPA recommendations. In 2004, Oregon adopted revised ammonia criteria based on updated EPA recommendations from 1999; however, these adopted criteria have never been in effect because EPA did not approve the revisions. In August 2012, the National Marine Fisheries Service, as part of Endangered Species Act consultation requirements, determined that the 1999 EPA ammonia criteria that Oregon adopted would jeopardize threatened and endangered fish. Based on NMFS' determination and updated toxicity data indicating that mussels are the most sensitive species to ammonia, EPA disapproved Oregon's criteria on Jan. 31, 2013.

Regulated parties

Regulated parties include facilities that discharge to Oregon waterbodies and either have ammonia monitoring requirements or have permit limits for ammonia. These facilities include municipal wastewater discharge plants and industrial facilities.

Request for other options

During the public comment period, DEQ requested public comment on whether to consider other options for achieving the rules' substantive goals while reducing the rules' negative economic impact on business. This document includes a summary of comments and DEQ responses.

Statement of need

What need will the proposed rules address?

On Jan. 31, 2013, the U.S. Environmental Protection Agency disapproved Oregon's 2004 adoption of ammonia criteria. If Oregon fails to revise its ammonia criteria in a timely manner, federal regulations require EPA to develop criteria for Oregon or risk a third-party lawsuit.

Oregon's current criteria for ammonia do not reflect current science. EPA's latest criteria recommendations for ammonia take into account the sensitivity of freshwater mussels and snails to ammonia toxicity. Many Oregon watersheds have freshwater mussels and snails.

Uncertainty about what ammonia criteria will ultimately become effective makes facility planning difficult for dischargers that may need to adjust existing treatment options, design flows or other modifications to a facility based on revisions to the ammonia criteria. Ammonia is a common pollutant of concern in National Pollutant Discharge Elimination System discharge permits. Dischargers have been implementing ammonia criteria based on EPA's 1985 recommendations; however, subsequent EPA ammonia recommendations in 1999, 2009 and most recently 2013, were more or less stringent than the 1985 recommendations.

pH amendment

Current rules have an error in the pH standard for the main stem Snake River in Oregon. The current standard incorrectly identifies the river miles for the main stem Snake River as 260-335. The error occurred during reformatting of OAR Division 041 in 2003. Prior to that error, the pH standard of 7.0 to 9.0 applied to the full extent of the main stem of the Snake River bordering Oregon from river miles 176 to 409. However, the 2003 rule split the pH standard for the Snake River into basin-specific rules for the tributary subbasins, including the Grand Ronde, Powder, Malheur and Owyhee Rivers. DEQ established a separate rule section in OAR 340-041-0124 for the main stem Snake River during reformatting and intended to transfer the existing pH standards to this new section. DEQ only transferred the river miles indicated for the Snake River segment located in the Powder Basin to the revised rules, rather than the entire mainstem of the Snake River as intended.

Statewide and temperature natural conditions criterion notes

On Aug. 8, 2013, EPA disapproved rule sections OAR 340-041-0007(2) and OAR 340-041-0028(8) because of a U.S. District Court decision (Northwest Environmental Advocates v. U.S. E.P.A., 855 F.Supp.2d 1199 (D. Or. 2012)). Readers would not know about the disapproval when reading rule sections for statewide narrative natural conditions criteria and the natural conditions criterion for temperature. These sections are no longer in effect for Clean Water Act purposes and Oregon cannot use these criteria for Clean Water Act purposes, such as issuing certifications under CWA Section 401, wastewater discharge permits under CWA Section 402, or total maximum daily loads under CWA section 303(d).

Umatilla Basin clarifications

In April 2012, EQC amended the Water Quality Standards and Policies for the Umatilla Basin in OAR 340-041-0315 to correct the designated uses in Table 310A and establish site-specific water quality criteria for the West Division Main Canal in Table 315. EPA disapproved some of the

amendments. This created inconsistencies between designated uses and criteria that are effective and applicable for federal Clean Water Act purposes and the Oregon rules. EPA's disapproval affected the following amendments in whole or in part:

- Removal of the "Fish and Aquatic Life" and "Fishing" uses for the "overflow channels" segment of the West Division Main Canal only
- Addition of the "modified aquatic habitat" use for the "overflow channels" segment of the West Division Main Canal and the definition of that use in OAR 340-041-0002
- Application of the criteria in Table 315 for the "overflow channels" segment of the West Division Main Canal only because fish and aquatic life and fishing uses still apply to that segment
- The statement in the narrative toxics criterion noting that presence of substances at naturally occurring levels would not be considered harmful to the designated uses
- Application of the warm water dissolved oxygen criteria in OAR 340-041-0016(4) to the "overflow channels" segment of the West Division Main Canal to protect the new "modified aquatic habitat" use

How will the proposed rules address the need?

The proposed rules will adopt ammonia criteria that protect mussels, snails and other sensitive aquatic life species found in Oregon freshwaters. If EQC adopts the revised criteria and EPA subsequently approves the adopted criteria, the new ammonia criteria become effective for all Clean Water Act programs, including the National Pollutant Discharge Elimination System permitting program. Final criteria would provide dischargers a known target for planning and compliance purposes.

pH Amendment

The proposed rule will remove reference to river miles to clarify that the pH criterion applies to the entire main stem of the Snake River in Oregon.

Statewide and temperature natural conditions criterion notes

DEQ proposes to add a note following the rules to notify the reader that 340-041-0007(2) and 340-041-0028(8) are not effective for Clean Water Act purposes.

Umatilla Basin clarifications

The proposed rule removes those portions of the rule that EPA disapproved and clarifies those portions of the rule that EPA approved only for the "constructed channel" segment of the West Division Main Canal, but not for the "overflow channels" segment. The remaining rule language will remain effective and applicable under federal and state law.

How will DEQ know the rules have addressed the need?

DEQ will know the proposed rules addressed the needs described above if the rules clearly identify and define Oregon's revised criteria for ammonia and EPA promptly approves the ammonia rule revisions.

Rules affected, authorities, supporting documents

Lead division: Environmental Solutions Division

Program or activity: Water Quality Standards and Assessment

Chapter 340 action

Adopt	OAR 340-041-8033
Amend	OAR 340-041-0002, 340-041-0007, 340-041-0028, 340-041-0033, 340-041-0124, 340-041-0310, 340-041-0315
Repeal	
Renumber	
Amend and Renumber	

Statutory authority

ORS 468.020, 468B.030, 468B.035, 468B.048

Other authority

No other authorities

Statute implemented

ORS 468B.030, 468B.035 & 468B.048

Documents relied on for rulemaking ORS 183.335(2)(b)(C)

Document title	Document location
Table 30: Aquatic Life Water Quality Criteria for Toxic Pollutants	http://www.deq.state.or.us/wq/standards/docs/tables303140.pdf DEQ headquarters
Environmental Protection Agency, Region 10. EPA Clean Water Act 303(c) Determinations On Oregon's New and Revised Aquatic Life Toxic Criteria Submitted on July 8, 2004, and as Amended by Oregon's April 23, 2007 and July 21, 2011 Submissions. Jan. 30, 2013 EPA Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013. Office of Water EPA 822-R-13-001. April 2013.	http://www.deq.state.or.us/wq/standards/toxicsEPAaction.htm http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/upload/AQUATIC-LIFE-AMBIENT-WATER-QUALITY-CRITERIA-FOR-AMMONIA-FRESHWATER-2013.pdf http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/index.cfm

Other relevant EPA ammonia documents	DEQ headquarters
National Marine Fisheries Service. *Jeopardy and Destruction or Adverse Modification of Critical Habitat Endangered Species Act Biological Opinion for Environmental Protection Agency's Proposed Approval of Certain Oregon Administrative Rules Related to Revised Water Quality Criteria for Toxic Pollutants.* National Marine Fisheries Service Consultation Number: 2008/00148. Aug. 14, 2012.	DEQ headquarters
Table 310A: Designated Beneficial Uses, Umatilla Basin (340-041-0310)	http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/_340_tables/340-041-0310.pdf
Table 315: Water Quality Criteria, West Division Main Canal, Umatilla Basin	http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/_340_tables/340-041-0315.pdf
Environmental Protection Agency, Region 10. *Technical Support Document for EPA's Action on the State of Oregon's Revised Water Quality Standards for the West Division Main Canal*. Nov. 15, 2013.	http://www.deq.state.or.us/wq/standards/docs/EPATechSupport.pdf
Environmental Protection Agency, Region 10. *Disapproval of Oregon's Water Quality Standards: Natural Conditions Criteria for Temperature OAR 340-041-0028(8); Statewide Narrative Natural Conditions Criteria OAR 340-041-0007(2).* Aug. 8, 2013.	http://www.deq.state.or.us/wq/standards/docs/DisapprovalLetter.pdf

Fee Analysis

This rulemaking does not involve fees.

Statement of fiscal and economic impact ORS 183.335 (2)(b)(E)

Fiscal and Economic Impact

Ammonia Criteria Revisions

Though the proposed ammonia criteria will affect DEQ and the regulated community, DEQ does not expect the impact to be significant. The proposed chronic criteria are less stringent than Oregon's current chronic criteria for ammonia and the proposed acute criteria are generally more stringent than Oregon's current criteria. DEQ expects EPA will likely approve the criteria because DEQ based the proposed ammonia criteria revisions on EPA's latest recommendations.

Other Clarifications

The following proposed amendments do not create a positive or negative impact:

- OAR 340-041-0124 corrects an error concerning the pH standard that occurred during a previous rulemaking. The pH standard in the current rule incorrectly identifies the river miles of only a portion of the Snake River. DEQ proposes removing the errant river miles to apply the standard to the entire main stem.

- OAR 340-041-0002 and 340-041-0315 clarify or correct rules that the U.S. Environmental Protection Agency disapproved and that are not currently effective under the Clean Water Act. Notes added to 340-041-0007 and 340-041-0028 inform the reader that the sections are no longer effective due to EPA disapproval.

Statement of Cost of Compliance—Ammonia Criteria Revisions

1. State agencies

   Revising the ammonia criteria will require DEQ to incorporate new criteria into Clean Water Act programs, such as permitting, assessing state waters and developing Total Maximum Daily Loads. This will take DEQ staff additional time to account for differences between the proposed criteria and the current criteria.

DEQ NPDES Permitting Program

Individual Permits

In the near term, transitioning from the current to proposed ammonia criteria will require additional DEQ permitting staff time.

Direct Impacts

The proposed rules will require DEQ permitting staff to:

- Update existing guidance and water quality models to reflect changes to the criteria.
- Provide general technical assistance to approximately 47 industrial and domestic facilities currently permitted with ammonia effluent limits in their transition to the new ammonia criteria.
- Spend additional time administering permit renewals to account for changes in the ammonia criteria. Generally, this would be a one-time occurrence for each NPDES permit.
- Account for potential differences in ammonia compliance monitoring reviews for dischargers with ammonia effluent limits.

Indirect Impacts - None identified.

General Permits

Implementing the proposed water quality criteria will not have a direct or indirect effect on DEQ general permitting staff because general permits do not have ammonia limit requirements.

Stormwater Permits

DEQ issues three different types of stormwater permits:

1. Individual Municipal Separate Storm Sewer System (MS4) permits,
2. Construction stormwater permits, and
3. Industrial stormwater permits (1200 Z).

Because stormwater discharges are intermittent, DEQ uses the aquatic life criteria as the basis for stormwater permit requirements.

Direct Impacts

The revised ammonia criteria may affect 1200Z permits. There is an ammonia reference limit of 10 mg/L for the industrial stormwater permit, but this reference is based on an EPA limit, rather than state water quality standards. In the situation where a 1200Z permit is discharging to a stream impaired for ammonia, DEQ would base the benchmark on the state water quality standard. DEQ staff may need to evaluate options in developing an appropriate ammonia benchmark for discharges to

ammonia-impaired waterbodies, given that the ammonia criteria are dependent on pH and temperature.

It is not likely that changing the ammonia criteria will affect DEQ staff that administers MS4 and construction permits because these permits do not require ammonia monitoring.

Indirect Impacts - None identified

401 Certification Program

Generally, the proposed ammonia criteria will not affect issuing Clean Water Act section 401 certifications either directly or indirectly. Water quality parameters of interest in 401 activities, such as fill and removal projects in a stream or hydropower projects are typically conventional pollutants, such as dissolved oxygen, turbidity, and temperature—not ammonia.

Other State Permitting Agencies

DEQ does not anticipate the proposed rules would have a direct or indirect affect on other state agencies or change their involvement or the general permits they administer. DEQ and other state agencies, such as Oregon Department of Geology and Mineral Industries and Department of Agriculture, have roles and responsibilities in administering general permits. Generally, DEQ is responsible for administering the NPDES program, which regulates waste discharges to waters of the state.

DEQ Integrated Report Program

Direct Impacts

The proposed ammonia criteria may affect current 303(d) listings for ammonia and may involve DEQ staff who develop the Integrated Report. Based on the 2010 Integrated Report there are 15 waterbodies impaired for ammonia. Five of the waterbodies need Total Maximum Daily Loads and ten have approved TMDLs or other control measures in place. DEQ's Integrated Report staff use the chronic criteria for ammonia to evaluate whether waterbodies are meeting state water quality standards. DEQ expects the proposed chronic criteria to be less stringent than Oregon's current chronic criteria for ammonia; therefore, DEQ may propose delisting waterbodies where data shows that waterbodies meet the revised ammonia criteria. DEQ will reassess waterbodies using the new approved ammonia criteria in the next cycle of the Integrated Report.

Revising state criteria for a pollutant, particularly when DEQ must calculate criteria using an equation that accounts for different pH and temperature variables requires additional staff time to incorporate those changes into the assessment.

Indirect Impacts - None identified

DEQ Total Maximum Daily Load Program

Direct Impacts

Revised ammonia criteria will likely increase DEQ staff time by approximately 10 to 50 percent to analyze the chronic and acute criteria when establishing waste load allocations because of the different duration exposures associated with the proposed criteria.

There are several waterbodies where DEQ must develop TMDLs for ammonia listings. There are also a number of waterbodies where DEQ has already developed TMDLs to address ammonia impairments. Following adoption and subsequent EPA approval of the proposed ammonia criteria, it is likely that DEQ will need to re-assess waste load and load allocations that DEQ developed for existing ammonia TMDLs to evaluate whether the existing pollutant allocations are still appropriate. For example, it is not yet clear whether waste load allocations would be based on the chronic 30-day rolling average, the 2.5 times the chronic criterion four-day average within the 30-day rolling average, or even the acute criteria duration based on a one-hour average. DEQ may need to base waste load allocations on both, with different compliance averaging periods. For example, DEQ could base one waste load allocation on a maximum monthly four-day average and the other on a maximum one-day average.

Indirect Impacts - None identified.

2. Local governments

DEQ anticipates adopting the new ammonia criteria could affect municipal wastewater treatment plants.

Direct Impacts

- The proposed rules could require facilities with a discharge greater than 1.0 million gallons per day to either update their mixing zone studies to reflect the appropriate design flow in conducting reasonable potential analyses, or collect additional water quality data to demonstrate protection of the receiving waterbody.

  DEQ has the option to use design flows 30Q5 or 30Q10 to determine compliance with the proposed chronic criteria. If DEQ used the 30Q5 design flow, the lowest 30-day average flow based on a five-year return interval, which it currently uses to determine compliance with non-carcinogenic human health toxics criteria, most dischargers would typically <u>not</u> need to revise mixing zone analyses. Dischargers would also need to demonstrate that a 7Q10 design flow is protective at 2.5 times the chronic criterion.

- The proposed rules could require facilities that discharge less than 1.0 million gallons a day to develop revised mixing zone studies to reflect design flows for chronic criteria described above. Historically, DEQ has not required many of these facilities to characterize their effluent for human health criteria, so their mixing zone studies may not include dilutions for 30Q5 flow.

- The proposed rules could require facilities to collect more monitoring data to adequately characterize the effluent and allow for averaging within a 30-day period. Additional data points would better characterize the discharge, minimize statistical

error associated with the reasonable potential analysis, and help identify outliers. Where DEQ established an ammonia effluent limit, DEQ may require additional compliance monitoring to demonstrate that "no four-day average concentrations should exceed 2.5 times the chronic criterion."

- The proposed rules would not result in a significant increase in the number of wastewater treatment plants with effluent limits for chronic ammonia criteria because the chronic criteria proposed are generally less stringent than Oregon's current chronic criteria for ammonia. Due to anti-backsliding rules, in cases where the proposed ammonia criteria result in effluent limits that are less stringent than the current limits, DEQ would typically preserve the previous, more stringent limits. There are some exceptions, including where EPA has approved a Total Maximum Daily Load and the waste load allocations specified in the TMDL contain less stringent effluent limitations than the permittee's current effluent limits. The Environmental Quality Commission could approve a pollutant load increase if it is consistent with the antidegradation requirements in Clean Water Act 303(d)(4) or it meets one of the exceptions in CWA 402(o)(2).

- The proposed rules could result in more effluent limits for the acute criteria because the proposed criteria are generally more stringent than Oregon's current criteria.

- The proposed rules could result in revised TMDL waste load allocations for facilities located in watersheds where DEQ has already developed TMDLs for ammonia. Depending on how DEQ determines the allocations, permit limits may become either more or less stringent. See the discussion in section *1. State agencies* above for more information.

- The proposed rules could result in DEQ removing waterbodies off the 303(d) list of impaired waterbodies for ammonia. If DEQ de-lists waterbodies, dischargers may be able to assess compliance with an ammonia permit limit by using a mixing zone rather than meeting ammonia criteria "at the end of pipe", which is otherwise generally required when discharging a pollutant of concern to a stream impaired for that pollutant.

- The proposed rules would not affect wastewater treatment plants until EPA approves the revised ammonia criteria. At the time of permit renewal, DEQ would evaluate whether the discharger needs new effluent limits to meet revised criteria for ammonia.

Indirect Impacts

A MS4 permit could be affected indirectly in waterbodies where there is an ammonia TMDL if DEQ determines that a MS4 permit must have an ammonia waste load allocation. If a MS4 permit holder needs a waste load allocation, DEQ does not anticipate a change in ammonia criteria would significantly affect a permittee's workload when compared to the currently effective ammonia criteria.

3. Public

DEQ does not expect the public to incur direct or indirect fiscal or economic impacts from the proposed rules. DEQ does not directly regulate individuals and it is unlikely that affected parties would increase sewer rates or costs for goods or services based on these proposed rules.

4. Large businesses - businesses with more than 50 employees

Industrial dischargers

DEQ requires many businesses to monitor and evaluate their effluent for ammonia if they discharge to a waterbody. Although there are some differences in ammonia monitoring requirements between industrial dischargers and wastewater treatment plants, the direct and indirect impacts associated with wastewater treatment plants in section *2. Local governments* above would generally apply to large businesses.

Pretreatment Program: Industrial dischargers with local limits for ammonia

DEQ does not expect the proposed amendments to the ammonia criteria would affect the pretreatment program either directly or indirectly. When an industrial facility discharges to a wastewater treatment plant rather than a waterbody, the wastewater treatment plant may require those facilities to have local limits to reduce certain pollutants through pretreatment measures before discharging to the plant's treatment system.

On June 20, 2014, DEQ staff sent an email asking industrial facilities that discharge effluent to wastewater treatment plants whether they had any local limits for ammonia. None of the facilities indicated they have local limits for ammonia.

5. Small businesses – businesses with 50 or fewer employees ORS 183.336

a. Estimated number of small businesses and types of businesses and industries with small businesses subject to proposed rule.	DEQ cross-referenced a list of current permit holders and a list of small businesses from the Oregon Department of Employment. The analysis indicates approximately five small businesses have ammonia effluent limits. These businesses are in the forest products, aerospace, technology and agriculture industries. *Small Business Impacts to Entities Covered Under Industrial Stormwater 1200Z Permits* Revising the state's ammonia criteria may affect 1200Z permit holders that discharge to waterbodies currently impaired for ammonia or where DEQ adds additional waterbodies to the state's impaired waterbody list in the future. See potential impacts in section *1. State agencies* above. DEQ does not track how many of the

	approximately 770 facilities holding industrial stormwater permits are small businesses.
b. Projected reporting, recordkeeping and other administrative activities, including costs of professional services, required for small businesses to comply with the proposed rule.	Small facilities that currently have a low monitoring burden could experience an increase in monitoring requirements and associated analytical costs to account for differences between the current and proposed chronic duration exposure. Small businesses might have to update their mixing zone analysis or conduct an additional environmental impact analysis typically requiring the services of an environmental consultant. In cases where DEQ requires ammonia effluent limits, there could be additional compliance monitoring, administrative and treatment costs. DEQ does not expect these costs would be significantly more than complying with the current ammonia criteria.
c. Projected equipment, supplies, labor and increased administration required for small businesses to comply with the proposed rule.	For most facilities that currently monitor for ammonia, the proposed rules would not require additional equipment or supplies. Labor needed to comply would depend on monitoring requirements and the need for effluent limits and subsequent treatment.
d. Describe how DEQ involved small businesses in developing this proposed rule.	DEQ did not involve small businesses specifically in this rulemaking. DEQ did send notice of the proposed rulemaking to a GovDelivery emailing list for this topic, which may have included some small businesses.

Documents relied on for fiscal and economic impact

Document title	Document location
DEQ Discharge Monitoring System data system[1]	DEQ headquarters 811 SW 6th Ave. Portland OR 97204

[1] DMS is a SQL Server database system is with an ASP.NET application interface that allows electronic entry, storage, and retrieval of self-reported Discharge Monitoring Reports that permittees submit monthly on approved, certified paper forms. Data in DMS ranges from January 2004 to present.

Oregon Department of Employment 4th quarter 2013 data	Employment Department 875 Union Street NE Salem OR 97311

Advisory committee

DEQ did not appoint an advisory committee on the fiscal and economic impact of this proposal because DEQ does not expect the rule amendments to be significant or controversial.

Housing cost

To comply with ORS 183.534, DEQ determined the proposed rules would have no effect on the development cost of a 6,000-square-foot parcel and construction of a 1,200-square-foot detached, single-family dwelling on that parcel. The proposed rules would generally affect facilities that discharge to waters of the state and applicable Clean Water Act programs.

Federal relationship

"It is the policy of this state that agencies shall seek to retain and promote the unique identity of Oregon by considering local conditions when an agency adopts policies and rules. However, since there are many federal laws and regulations that apply to activities that are also regulated by the state, it is also the policy of this state that agencies attempt to adopt rules that correspond with equivalent federal laws and rules..." ORS 183.332

Relationship to federal requirements

This section complies with the requirement in OAR 340-011-0029 and ORS 468A.327 to clearly identify the relationship between the proposed rules and applicable federal requirements.

The proposed rules would implement a federal requirement. The federal Clean Water Act requires states to adopt water quality standards to protect beneficial uses of the nation's waters. States must base standards on substantial evidence. DEQ must submit the proposed standards to EPA for approval after EQC adoption. DEQ determined the proposed ammonia standards revisions meet federal requirements. DEQ worked with EPA while developing the proposed rules and DEQ expects EPA will likely approve these proposed rules.

Other rule amendments and rule notes would correct errors, provide additional clarifications and align with plain English requirements.

What alternatives did DEQ consider if any?

DEQ analyzed what would happen if it took no action. This alternative would force EPA to impose its own regulations to address the deficiencies related to its Jan. 31, 2013, action disapproving Oregon's ammonia criteria. In addition, the errors or corrections from past rulemakings would persist in DEQ rules and complicate implementation.

DEQ considered addressing EPA's disapproval of the other aquatic life toxics criteria that EPA disapproved in its January 2013 action on aluminum, cadmium and copper as part of this rulemaking. However, the potential remedies to address EPA's disapproval for these pollutants are more complex and will involve additional work with EPA, the National Marine Fisheries Service, interested stakeholders and DEQ staff. Instead, DEQ proposes to amend only the ammonia criteria because the proposed rules would wholly adopt EPA's latest criteria without any modifications based on Oregon circumstances. Before DEQ began this rulemaking, stakeholders indicated that EPA's criteria were appropriate for Oregon and encouraged DEQ to pursue adoption of these criteria as soon as possible.

Land use

"It is the Commission's policy to coordinate the Department's programs, rules and actions that affect land use with local acknowledged plans to the fullest degree possible." OAR 340-018-0010

Land-use considerations

To determine whether the proposed rules involve programs or actions that are considered a *land-use action*, DEQ considered:

- Statewide planning goals for specific references. Section III, subsection 2 of the DEQ State Agency Coordination Program document identifies the following statewide goal relating to DEQ's authority:

Goal	Title
5	Open Spaces, Scenic and Historic Areas, and Natural Resources
6	Air, Water and Land Resources Quality
11	Public Facilities and Services
16	Estuarial resources
19	Ocean Resources

- OAR 340-018-0030 for EQC rules on land-use coordination. Division 18 requires DEQ to determine whether proposed rules will significantly affect land use. If yes, how will DEQ:
  - Comply with statewide land-use goals, and
  - Ensure compatibility with acknowledged comprehensive plans, which DEQ most commonly achieves by requiring a Land Use Compatibility Statement.
- DEQ's mandate to protect public health and safety and the environment.
- Whether DEQ is the primary authority that is responsible for land-use programs or actions in the proposed rules.
- Present or future land uses identified in acknowledged comprehensive plans.

Determination

DEQ's statewide goal compliance and local plan compatibility procedures adequately cover the proposed rules.

The water quality standards program in general could affect land uses, but the proposed rules do not. The proposed rules would revise Oregon's freshwater criteria for ammonia and provide minor corrections, but do not change the beneficial uses of state waters and the water quality standards that protect those uses.

Summary of comments and DEQ responses

For public comments received by the close of the public comment period, the following table organizes comments into categories with cross references to the commenter number. DEQ's response follows the summary. Original comments are on file with DEQ.

1 Comment Aquatic life freshwater ammonia criteria revisions

DEQ received comments in this category from commenters 1, 2, 3 and 4 listed in the *Commenter* section below. DEQ did not change the proposed rules in response to comments.

EPA supports the proposed revisions to Oregon's aquatic life freshwater criteria for ammonia. EPA remains hopeful that its current ammonia recommendations will address the concerns raised in the National Marine Fisheries Service Biological Opinion (NMFS).

The Association of Clean Water Agencies supports the ammonia revisions, and acknowledges that there will be costs for increased treatment and TMDL development.

Since NMFS has not yet made a determination on the protectiveness of EPA's latest ammonia criteria, NWEA can neither endorse nor reject DEQ's proposed revisions and believes it is unfair to ask the public to provide comment on the revisions without the benefit of NMFS fishery experts. Northwest Pulp and Paper Association neither endorsed nor opposed the ammonia criteria revisions, but asked to work with DEQ on implementation.

Response

DEQ appreciates EPA's and ACWA's support of the ammonia revisions. EPA's latest 2013 criteria recommendations are based on a very large dataset and are the result of 27 years worth of toxicity data. The dataset includes threatened and endangered species found in Oregon, such as Coho salmon, Rainbow trout (OR-steelhead), Chinook salmon, Lost River sucker, Lahontan cutthroat trout, and Sockeye salmon. Oregon's current criteria are based on prior EPA recommendations from 1985 which are no longer based on the most recent toxicological effects of ammonia on aquatic life, including effects to other sensitive species found in Oregon, such as mussels and snails. Because of the nine year time period between EQC's 2004 adoption of revised ammonia criteria based on EPA's 1999 recommendations and EPA's action on the 2004 criteria in January 2013, Oregon dischargers have been unable to plan for potential pollution control investments because of the uncertainty of which ammonia criteria would ultimately be approved by EPA. For these reasons and other reasons indicated below, DEQ proposes to adopt the ammonia revisions now.

DEQ acknowledges that it is uncertain whether the National Marine Fisheries Service will find that the proposed ammonia criteria, based on EPA's latest recommendations are protective of threatened and endangered salmonid species residing in Oregon. This uncertainty is mainly attributed to the acute criteria. EPA has been working with NMFS to address the Reasonable and Prudent Alternatives in the Biological Opinion. EPA has communicated to DEQ that it remains optimistic that its latest 2013 ammonia criteria will be protective of threatened and endangered salmonid species in Oregon.

EQC's adoption of revised criteria must go to EPA for approval before the criteria become effective for CWA purposes. DEQ submission to EPA requires EPA to respond within 90 days. Therefore, it is in DEQ's best interest to adopt criteria now, so that EPA continues working with NMFS in a timely manner and avoid further delays. In addition, according to CWA regulations, DEQ is required to address EPA disapprovals within 90 days of receiving EPA's action. For these reasons, DEQ believes it is prudent to adopt these ammonia revisions now. If EPA determines that Oregon's adoption of its 2013 recommended criteria would not be approvable, DEQ would seek guidance from EPA on acceptable alternatives.

Lastly, DEQ will work closely with the regulated community and interested parties, as appropriate, on any implementation issues that are identified following EPA approval.

2 Comment

Addition of disapproval notes to the statewide natural conditions criterion in OAR 340-041-0007(2) and the natural conditions criterion for temperature in OAR 340-041-0028(8) based on EPA disapproval.

DEQ received comments in this category from commenters 3, 4, and 5 listed in the *Commenter* section below. DEQ did not change the proposed rules in response to comments.

Northwest Pulp and Paper Association supports the disapproval notes and opposes any additional changes to the notes and asks DEQ to clarify that these notes were based on NWEA litigation.

Oregon Forest Industries Council supports the disapproval notes and would oppose removing these criteria all together, since they believe the natural conditions criteria remain important elements of Oregon's clean water program.

Northwest Environmental Advocates believe the disapproval note is ambiguous; therefore, DEQ should remove the disapproved language entirely because they are now disapproved standards.

Response

DEQ did not remove the disapproved portions of the statewide natural conditions criterion and the natural conditions criterion for temperature because the agency has not yet determined how it proposes to address EPA's disapproval of these standards. DEQ will consider how to address natural variability in stream temperature and other situations in which water quality criteria are unattainable due to natural conditions, and expects to make recommendations to EQC for revising these water quality standards. As a result, the natural conditions provisions are still part of EQC's policy, even though they are not effective for Clean Water Act purposes. As part of the standards review and rulemaking process, DEQ will provide an opportunity to comment on the proposed revisions to the temperature standard.

DEQ added the lawsuit citation under the Statement of Need section in this report for additional clarity.

3 Comment Plain English revisions

DEQ received comments in this category from commenters 3 and 5 listed in the *Commenter* section below. DEQ did not change the proposed rules in response to comments.

Both Northwest Pulp and Paper Association and the Oregon Forest Industries Council were supportive of plain English revisions as long as no substantive changes were made. They would oppose any additional edits for readability as a result of public comment.

Response

It is DEQ's intention to only clarify existing rule language in Division 41 to be consistent with the Administrative Procedures Act. DEQ does not believe these changes were substantive. DEQ did not receive any comments on proposed plain English revisions or additional suggestions for other clarifications based on public comment. Therefore, the amendments that went out for public comment are the same amendments that are proposed for EQC adoption.

4 Comment DEQ's use of mixing zones for ammonia

DEQ received comments in this category from commenter 4 listed in the *Commenter* section below. DEQ did not change the proposed rules in response to comments.

Northwest Environmental Advocates opposes the use of mixing zones for ammonia because mussels cannot escape from higher concentrations of

ammonia in a mixing zone. Therefore, these criteria should be met at the end-of-pipe. Absent the adoption of specific rules to eliminate or limit the use of mixing zones for ammonia, permit writers will continue to issue NPDES discharge permits without regard to its effect on freshwater mussels. At a minimum, DEQ should require the collection of and address evidence of localized extirpations of freshwater mussels.

Response

This rulemaking proposes to revise freshwater ammonia criteria based on the most current data. DEQ is not revising its mixing zone policy as part of this rulemaking. DEQ generally addresses the concern of mixing zone impacts upon non-mobile shellfish communities by limiting the size and extant of the mixing zones in accordance with state rules (OAR 340-041-0053) and current guidance (Regulated Mixing Zone IMD Vol. 1).

DEQ does not believe it is necessary to require dischargers to collect and address evidence of localized extirpations of freshwater mussels. DEQ's proposed amendments to the ammonia criteria are based on the assumption that mussels are present in all freshwater systems and that use must be protected. The proposed criteria should protect most mussels and snails that are present or could be present in the future. If a third party wished to support site-specific criteria based on the justification that mussels are not present at a site, DEQ would require a rigorous mussel survey, including evidence indicating that mussels have not likely been present at the site since prior to 1975.

Commenters

Comments received by close of public comment period

The table below lists people and organizations that submitted public comments about the proposed rules by the deadline of Oct. 30, 2014. Original comments are on file with DEQ.

1 Commenter Kathleen Collins
Affiliation U.S. Environmental Protection Agency, Region 10

This commenter submitted comments under category 1 in the *Summary of comments and DEQ responses* section above.

2 Commenter Janet Gillaspie
Affiliation Oregon Association of Clean Water Agencies

This commenter submitted comments under category 1 in the *Summary of comments and DEQ responses* section above.

3 Commenter Kathryn VanNatta
Affiliation Northwest Pulp and Paper Association

This commenter submitted comments under categories 1, 2 and 3 in the *Summary of comments and DEQ responses* section above.

4 Commenter Nina Bell
Affiliation Northwest Environmental Advocates

This commenter submitted comments under categories 1, 2 and 4 in the *Summary of comments and DEQ responses* section above.

5 Commenter Heath Curtiss
Affiliation Oregon Forest Industries Council

This commenter submitted comments under categories 2 and 3 in the *Summary of comments and DEQ responses* section above.

Comments received after close of public comment period

No comments were received after the close of the public comment period.

Advisory committee

DEQ did not convene an advisory committee. DEQ did not anticipate the proposed rules will have a significant fiscal or economic impact or would be controversial. DEQ considered:

- The proposed acute criteria for ammonia are generally more stringent than the current acute criteria for Oregon.
- The proposed chronic criteria are less stringent than what Oregon is currently implementing. Typically, these criteria are more stringent than the acute criteria.
- DEQ proposes to wholly adopt EPA's criteria, rather than modify any parts of the criteria based on particular state circumstances.

Prior to initiating rulemaking, DEQ sent an invitation to Oregon tribes and to a wide range of stakeholders to discuss and provide input to DEQ on rulemaking priorities to address EPA disapproved criteria for aluminum, ammonia, cadmium (acute) and copper. During these meetings, DEQ also shared information about EPA's updated criteria for freshwater copper and ammonia. Some stakeholders indicated that they did not believe forming an advisory committee was necessary. Other stakeholders did not specifically indicate whether forming an advisory committee was necessary. Generally, their interest was in adopting EPA's criteria as soon as possible. The table below lists the groups DEQ met with prior to initiating rulemaking for ammonia.

Table 1: List of Stakeholder Groups

Stakeholder Group	Date
1. Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians	Jan. 30, 2014
2. Cow Creek Band of Umpqua Tribe of Indians	Jan. 30, 2014
3. Pesticide Management Team (select members)	Jan. 30, 2014
4. Industrial Stormwater Dischargers	Jan. 31, 2014
5. Conservation/Fisheries Groups	Feb. 5, 2014
6. Association of Clean Water Agencies	Feb. 18, 2014
7. Associated Oregon Industries	Feb. 21, 2014

On June 3, 2014, DEQ e-mailed 3,383 people who signed up for water quality standards information through the free Gov Delivery subscription service. The email informed interested persons that DEQ was initiating rulemaking to revise freshwater criteria for ammonia and provided a link to more information.

DEQ conducted a public webinar Sept. 10, 2014, prior to the public comment period where DEQ staff provided information about the rulemaking. DEQ did not record the webinar or accept any public comment. DEQ sent a webinar announcement through Gov Delivery to the same distribution

list indicated above and posted the announcement to the Water Quality Standards ammonia webpage: http://www.oregon.gov/deq/WQ/Pages/Standards/ammonia.aspx.

EQC prior involvement

DEQ shares general rulemaking information with EQC through the monthly Director's Report. DEQ did not present additional information to EQC about these proposed rules.

Public notice

DEQ provided Notice of Proposed Rulemaking with Hearing for this rulemaking. DEQ submitted notice to:

- Secretary of State for publication in the October 2014 *Oregon Bulletin* on Sept. 15, 2014.
- The Ammonia Web page: http://www.oregon.gov/deq/WQ/Pages/Standards/ammonia.aspx on Sept. 16, 2014.
- The Rulemaking web page: http://www.oregon.gov/deq/RulesandRegulations/Pages/proposedrule.aspx on Sept. 16, 2014.
- 3,383 interested parties on the water quality standards list through Gov Delivery on Sept. 16, 2014.
- EPA on Sept. 17, 2014.
- The following key legislators required under ORS 183.335(15) on Sept. 17, 2014:
    - Senator Michael Dembrow, Chair, Senate Committee on Environment and Natural Resources
    - Representative Paul Holvey, Chair, House Committee on Energy and Environment

Stakeholder and public involvement

Public hearings and comment

DEQ held one public hearing.

Presiding Officers' Record

Hearing 1

Location:	Portland
Date:	Oct. 15, 2014
Time:	Convened at 6:10 p.m. and closed at 6:15 p.m.
Presiding Officer:	Debra Sturdevant, Manager, Water Quality Standards and Assessment Section

One person from the public attended the hearing. This person informed staff that she did not wish to make oral comments or submit written comments for the record at this hearing. DEQ staff presenters were Andrea Matzke, Aron Borok and Spencer Bohaboy.

DEQ offered to review the presentation with the attendee, but this offer was declined, since she had attended a previous webinar on the rulemaking proposal. Instead she requested to ask DEQ staff specific questions about the rulemaking and implementation of the new criteria. Therefore, the presiding officer closed the testimony portion of the hearing at 6:15 and following that, staff had an informal discussion with the attendee and answered questions as they were able.

Implementation

Notification

The proposed rules would become effective upon EPA approval. DEQ will notify affected parties by:

- Sending out a Gov Delivery notice to 3,383 interested parties on the water quality standards list
- Posting notification on the Water Quality Standards website, including links to rulemaking documents: http://www.deq.state.or.us/wq/standards/standards.htm
- Regional permitting staff emailing communication to individual NPDES permit holders

Compliance and enforcement

- Affected parties – No changes in implementation anticipated.
- DEQ staff – No changes in implementation anticipated

Measuring, sampling, monitoring and reporting

- Affected parties – Dischargers will need to assess their current monitoring, sampling and reporting requirements and determine whether changes are needed to comply with the revised ammonia criteria requirements.
- DEQ staff – As needed, permitting staff will develop internal and external monitoring and sampling guidance documents, including revisions to the Reasonable Potential Analysis workbook, to assure that the revised ammonia criteria are correctly implemented.

Systems

- Website – DEQ will post notification on the Water Quality Standards website, including links to rulemaking documents: http://www.deq.state.or.us/wq/standards/standards.htm
- Database – No implementation actions related to water quality databases, such as the Discharge Monitoring System are needed.
- Invoicing – Not applicable.

Training

- Affected parties – It is unlikely that DEQ will need to conduct specific discharger training based on revised ammonia criteria. However, if the need arises, DEQ will consider providing any needed training.
- DEQ staff – It is likely that DEQ will provide general training and assistance to permitting staff to assure that the revised ammonia criteria are correctly implemented.

Five-year review

ORS 183.405

Requirement

The state Administrative Procedures Act, ORS 183.405(1), requires DEQ to review new rules within five years after the date EQC adopts the proposed rules. The same statute exempts from review rules that are only amended. ORS 183.405(2) only requires that DEQ use "available information" to comply with the review requirement.

ORS 183.405(4) exempts the following rules from review because they were only amended in this rulemaking:

- 340-041-0002
- 340-041-0007
- 340-041-0028
- 340-041-0033
- 340-041-0124
- 340-041-0310
- 340-041-0315

ORS 183.405 requires that DEQ review OAR 340-041-8033 because that rule was newly adopted in this rulemaking.

DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER POLLUTION

DIVISION 41

WATER QUALITY STANDARDS: BENEFICIAL USES, POLICIES, AND CRITERIA FOR OREGON

340-041-0002

Definitions

Definitions in this rule apply to all basins unless context requires otherwise.

(1) "401 Water Quality Certification" means a determination made by DEQ that a dredge and fill activity, private hydropower facility, or other federally licensed or permitted activity that may result in a discharge to waters of the state has adequate terms and conditions to prevent an exceedance of water quality criteria. The federal permit in question may not be issued without this state determination in accordance with the Federal Clean Water Act, section 401 (33 USC 1341).

(2) "Ambient Stream Temperature" means the stream temperature measured at a specific time and place. The selected location for measuring stream temperature must be representative of the stream in the vicinity of the point being measured.

(3) "Anthropogenic," when used to describe "sources" or "warming," means that which results from human activity~~;~~.

(4) "Applicable Criteria" means the biologically based temperature criteria in OAR 340-041-0028(4), the superseding cold water protection criteria in OAR 340-041-0028(11)~~,~~ or the superseding natural condition criteria ~~as described~~ in OAR 340-041-0028(8). The applicable criteria may also be site-specific criteria approved by U.S. EPA. A subbasin may have a combination of applicable temperature criteria derived from some or all of these numeric and narrative criteria.

(5) "Appropriate Reference Site or Region" means a site on the same water body or within the same basin or ecoregion that has similar habitat conditions and represents the water quality and biological community attainable within the areas of concern.

(6) "Aquatic Species" means plants or animals that live at least part of their life cycle in waters of the state.

(7) "Basin" means a third-field hydrologic unit as identified by the U.S. Geological Survey.

(8) "BOD" means 5-day, 20°C Biochemical Oxygen Demand.

(9) "Cold-Water Aquatic Life" means aquatic organisms that are physiologically restricted to cold water~~,~~ including, but not limited to, native salmon, steelhead, mountain whitefish, char ~~(~~including bull trout~~)~~, and trout.

(10) "Cold Water Refugia" means those portions of a water body where or times during the diel temperature cycle when the water temperature is at least 2 degrees Celsius colder than the daily maximum temperature of the adjacent well-mixed flow of the water body.

(11) "Commission" or "EQC" means the Oregon Environmental Quality Commission.

(12) "Cool- Water Aquatic Life" means aquatic organisms that are physiologically restricted to cool waters~~,~~ including, but not limited to, native sturgeon, Pacific lamprey, suckers, chub, sculpins~~,~~ and certain species of cyprinids (minnows.)~~.~~

(13) "Core Cold- Water Habitat Use" means waters ~~that are~~ expected to maintain temperatures within the range generally considered optimal for salmon and steelhead rearing, or that are suitable for bull trout migration, foraging~~,~~ and sub-adult rearing that occurs during the summer. These uses are designated on the following subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130A, 151A, 160A, 170A, 180A, 201A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A.

(14) "Critical Habitat" means those areas that support rare, threatened, or endangered species or serve as sensitive spawning and rearing areas for aquatic life as designated by the U.S. Fish and Wildlife Service or National Oceanic and Atmospheric Administration-Fisheries ~~pursuant~~ according to the Endangered Species Act (16 U.S. Code § 1531).

(15) "Daily Mean" for dissolved oxygen means the numeric average of an adequate number of data to describe the variation in dissolved oxygen concentration throughout a day, including daily maximums and minimums. ~~For the purpose of~~For calculating the mean, concentrations in excess of 100 percent of saturation are valued at the saturation concentration.

(16) "Department" or "DEQ" means the Oregon State Department of Environmental Quality.

(17) "Designated Beneficial Use" means the purpose or benefit to be derived from a water body as designated by the Water Resources Department or the Water Resources Commission.

(18) "DO" means dissolved oxygen.

(19) "Ecological Integrity" means the summation of chemical, physical, and biological integrity capable of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region.

(20) "Epilimnion" means the seasonally stratified layer of a lake or reservoir above the metalimnion; the surface layer.

(21) "Erosion Control Plan" means a plan containing a list of best management practices to be applied during construction to control and limit soil erosion.

(22) “Estuarine Waters” means all mixed fresh and oceanic waters in estuaries or bays from the point of oceanic water intrusion inland to a line connecting the outermost points of the headlands or protective jetties.

(23) "High Quality Waters" means those waters that meet or exceed levels ~~that are~~ necessary to support the propagation of fish, shellfish~~,~~ and wildlife; recreation in and on the water; and other designated beneficial uses.

(24) "Hypolimnion" means the seasonally stratified layer of a lake or reservoir below the metalimnion; the bottom layer.

(25) "Industrial Waste" means any liquid, gaseous, radioactive, or solid waste substance or a combination thereof resulting from any process of industry, manufacturing, trade, or business or from the development or recovery of any natural resources.

(26) "In Lieu Fee" means a fee collected by a jurisdiction in lieu of requiring construction of onsite stormwater quality control facilities.

(27) "Intergravel Dissolved Oxygen" (IGDO) means the concentration of oxygen measured in the water within the stream bed gravels. Measurements should be taken within a limited time period before emergence of fry.

(28) "Jurisdiction" means any city or county agency in the Tualatin River and Oswego Lake subbasin that regulates land development activities within its boundaries by approving plats or site plans or issuing permits for land development.

(29) "Land Development" means any human-induced change to improved or unimproved real estate~~, including but not limited to~~ including, but not limited to, construction, installation or expansion of a building or other structure; land division; drilling; ~~and~~ or site alteration such as land surface mining, dredging, grading, construction of earthen berms, paving, improvements for use as parking or storage, excavation~~,~~ or clearing.

(30) "Load Allocation” or ~~(~~“LA~~)~~" means the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading that may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading. Whenever possible, natural and nonpoint source loads should be distinguished.

(31) "Loading Capacity" or ("LC)" means the greatest amount of loading that a water body can receive without violating water quality standards.

(32) "Low Flow Period" means the flows in a stream resulting primarily from groundwater discharge or base flows augmented from lakes and storage projects during the driest period of the year. The dry weather period varies across the state according to climate and topography. Wherever the low flow period is indicated in Water Quality Management Plans, this period has been approximated by the inclusive months. Where applicable in a waste discharge permit, the low flow period may be further defined.

(33) "Managed Lakes" refers to lakes in which hydrology is managed by controlling the rate or timing of inflow or outflow,.

(34) "Marine Waters" means all oceanic, offshore waters outside of estuaries or bays and within the territorial limits of the State of Oregon.

(35) "mg/l" or "mg/L" means milligrams per liter.

(36) "Metalimnion" means the seasonal, thermally stratified layer of a lake or reservoir that is characterized by a rapid change in temperature with depth and that effectively isolates the waters of the epilimnion from those of the hypolimnion during the period of stratification; the middle layer.

(37) "Migration Corridors" mean those waters that are predominantly used for salmon and steelhead migration during the summer and have little or no anadromous salmonid rearing in the months of July and August., as Migration corridors are designated in . These uses are designated on the following subbasin maps designate these uses in set out at OAR 340-041-0101 to 340-041-0340: Tables 101B, and 121B, and Figures 151A, 170A, 300A and 340A under OAR 340-041-0101 to 340-041-0340.

(38) "Minimum" for dissolved oxygen means the minimum recorded concentration including seasonal and diurnal minimums.

(39) "Modified Aquatic Habitat" means waters in which cool or cold-water aquatic communities are absent, limited or substantially degraded due to modifications of the physical habitat, hydrology or water quality. The physical, hydrologic or chemical modifications preclude or limit the attainment of cool or cold water habitat or the species composition that would be expected based on a natural reference stream, and cannot feasibly or reasonably be reversed or abated.

(40) (39) "Monthly (30-day) Mean Minimum" for dissolved oxygen means the minimum of the 30 consecutive-day floating averages of the calculated daily mean dissolved oxygen concentration.

~~(41)~~(40) "Natural Conditions" means conditions or circumstances affecting the physical, chemical, or biological integrity of a water of the state that are not influenced by past or present anthropogenic activities. Disturbances from wildfire, floods, earthquakes, volcanic or geothermal activity, wind, insect infestation~~,~~ and diseased vegetation are considered natural conditions.

~~(42)~~(41) "Natural Thermal Potential" means the determination of the thermal profile of a water body using best available methods of analysis and the best available information on the site-potential riparian vegetation, stream geomorphology, stream flows~~,~~ and other measures to reflect natural conditions.

~~(43)~~(42) "Nonpoint Sources" means any source of water pollution other than a point source. Generally, a nonpoint source is a diffuse or unconfined source of pollution where wastes can ~~either~~ either enter into waters of the state or be conveyed by the movement of water into waters of the state.

~~(44)~~(43) "Ocean Waters" means all oceanic, offshore waters outside of estuaries or bays and within the territorial limits of Oregon.

~~(45)~~(44) "Outstanding Resource Waters" means ~~those~~ waters designated by the ~~commission~~ EQC where existing high quality waters constitute an outstanding state or national resource based on their extraordinary water quality or ecological values or where special water quality protection is needed to maintain critical habitat areas.

~~(46)~~(45) "Pollution" means such contamination or other alteration of the physical, chemical, or biological properties of any waters of the state, including change in temperature, taste, color, turbidity, silt, or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any water of the state that either by itself or in connection with any other substance present can reasonably be expected to create a public nuisance or render such waters harmful, detrimental, or injurious to public health, safety, or welfare; to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or to livestock, wildlife, fish, other aquatic life or the habitat thereof.

~~(47)~~(46) "Point Source" means a ~~discernable~~discernible, confined, and discrete conveyance ~~, including but not limited to~~including, but not limited to, a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel or other floating craft, or leachate collection system from which pollutants are or may be discharged. Point source does not include agricultural storm water discharges and return flows from irrigated agriculture.

~~(48)~~(47) "Public Water" means the same as "waters of the state".

~~(49)~~(48) "Public Works Project" means any land development conducted or financed by a local, state, or federal governmental body.

~~(50)~~(49) "Reserve Capacity" means that portion of a receiving stream's loading capacity that has not been allocated to point sources or to nonpoint sources and natural background as waste load allocations or load allocations, respectively. The reserve capacity includes that loading capacity that has been set aside for a safety margin and is otherwise unallocated.

~~(51)~~(50) "Resident Biological Community" means aquatic life expected to exist in a particular habitat when water quality standards for a specific ecoregion, basin~~,~~ or water body are met. This must be established by accepted biomonitoring techniques.

~~(52)~~(51) "Salmon" means chinook, chum, coho, ~~sockeye, and~~sockeye and pink salmon.

~~(53)~~(52) "Salmon and Steelhead Spawning Use" means waters that are or could be used for salmon and steelhead spawning, egg incubation, and fry emergence. These uses are designated on the following subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Tables 101B, and 121B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B.

~~(54)~~(53) "Salmon and Trout Rearing and Migration Use" means thermally suitable rearing habitat for salmon, steelhead, rainbow trout, and cutthroat trout as designated on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A.

~~(55)~~(54) "Salmonid or Salmonids" means native salmon, trout, mountain whitefish~~,~~ and char ~~(~~including bull trout~~)~~. For purposes of Oregon water quality standards, salmonid does not include brook or brown trout because ~~since~~ they are introduced species.

~~(56)~~(55) "Secondary Treatment" means the following depending on the context:

(a) For "sewage wastes," secondary treatment means the minimum level of treatment mandated by ~~EPA~~ U.S. Environmental Protection Agency regulations pursuant to Public Law 92-500.

(b) For "industrial and other waste sources," secondary treatment means control equivalent to best practicable treatment ~~(BPT)~~.

~~(57)~~(56) "Seven-Day Average Maximum Temperature" means a calculation of the average of the daily maximum temperatures from seven consecutive days made on a rolling basis.

~~(58)~~(57) "Sewage" means the water-carried human or animal waste from residences, buildings, industrial establishments, or other places together with such groundwater infiltration and surface water as may be present. The admixture with sewage of industrial wastes or wastes, as defined in this rule, may also be considered "sewage" within the meaning of this division.

~~(59)~~(58) "Short-Term Disturbance" means a temporary disturbance of six months or less when water quality standards may be violated briefly but not of sufficient duration to cause acute or chronic effects on beneficial uses.

~~(60)~~(59) "Spatial Median" means the value that falls in the middle of a data set of multiple intergravel dissolved oxygen (IGDO) measurements taken within a spawning area. Half the samples should be greater than and half the samples should be less than the spatial median.

~~(61)~~(60) "SS" means suspended solids.

~~(62)~~(61) "Stormwater Quality Control Facility" means any structure or drainage way ~~that is~~ designed, constructed~~,~~ and maintained to collect and filter, retain, or detain surface water runoff during and after a storm event for the purpose of water quality improvement. It may also include, but is not be limited to, existing features such as wetlands, water quality swales~~,~~ and ponds ~~that are~~ maintained as stormwater quality control facilities.

~~(63)~~(62) "Subbasin" means a fourth-field hydrologic unit as identified by the U.S. Geological Survey.

~~(64)~~(63) "Summer" means June 1 through September 30 of each calendar year.

~~(65)~~(64) "Threatened or Endangered Species" means aquatic species listed as either threatened or endangered under the federal Endangered Species Act (16 U.S. Code~~C~~ § 1531 et seq. and Title 50 of the Code of Federal Regulations).

~~(66)~~(65) "Total Maximum Daily Load (TMDL)" means the sum of the individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and background. If receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.

~~(67)~~(66) "Toxic Substance" means those pollutants or combinations of pollutants, including disease-causing agents, that after introduction to waters of the state and upon exposure, ingestion, inhalation~~,~~ or assimilation either directly from the environment or indirectly by ingestion through food chains will cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformations in any organism or its offspring.

~~(68)~~(67) "Wasteload Allocation" or "~~(~~WLA~~)~~" means the portion of a receiving water's loading capacity ~~that is~~ allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality-based effluent limitation.

~~(69)~~(68) "Warm-Water Aquatic Life" means the aquatic communities that are adapted to warm-water conditions and do not contain either cold- or cool-water species.

~~(70)~~(69) "Wastes" means sewage, industrial wastes, and all other liquid, gaseous, solid, radioactive, or other substances that may cause or tend to cause pollution of any water of the state.

~~(71)~~(70) "Water Quality Limited" means one of the following:

(a) A receiving stream that does not meet narrative or numeric water quality criteria during the entire year or defined season even after the implementation of standard technology;

(b) A receiving stream that achieves and is expected to continue to achieve narrative or numeric water quality criteria but uses higher than standard technology to protect beneficial uses;

(c) A receiving stream for which there is insufficient information to determine whether water quality criteria are being met with higher-than-standard treatment technology or a receiving stream that would not be expected to meet water quality criteria during the entire year or defined season without higher than standard technology.

~~(72)~~(71) "Water Quality Swale" means a natural depression or wide, shallow ditch ~~that is~~ used to temporarily store, route~~,~~ or filter runoff for the purpose of improving water quality.

~~(73)~~(72) "Waters of the ~~State~~state" means lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon, and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters) that are located wholly or partially within or bordering the state or within its jurisdiction.

~~(74)~~(73) "Weekly (seven-day) Mean Minimum" for dissolved oxygen means the minimum of the seven consecutive-day floating average of the calculated daily mean dissolved oxygen concentration.

~~(75)~~(74) "Weekly (seven-day) Minimum Mean" for dissolved oxygen means the minimum of the seven consecutive-day floating average of the daily minimum concentration. For ~~purposes of~~ application of the criteria, this value ~~will be used as~~ is the reference for diurnal minimums.

~~(76)~~(75) "Without Detrimental Changes in the Resident Biological Community" means no loss of ecological integrity when compared to natural conditions at an appropriate reference site or region.

Stat. Auth.: ORS 468.020, 468B.010, 468B.015, 468B.035, 468B.048
Stats. Implemented: ORS 468B.035, 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03; DEQ 3-2004, f. & cert. ef. 5-28-04; DEQ 2-2007, f. & cert. ef. 3-15-07; DEQ 3-2012, f. & cert. ef. 5-21-12

340-041-0007

Statewide Narrative Criteria

(1) Notwithstanding the water quality standards contained in this Division, the highest and best practicable treatment and/or control of wastes, activities, and flows must in every case be provided so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels.

(2) Where a less stringent natural condition of a water of the State exceeds the numeric criteria set out in this Division, the natural condition supersedes the numeric criteria and becomes the standard for that water body. However, there are special restrictions, described in OAR 340-041-0004(9)(a)(D)(iii), that may apply to discharges that affect dissolved oxygen.

NOTE: On August 8, 2013, the Environmental Protection Agency disapproved rule section OAR 340-041-0007(2). Consequently, section (2) is no longer effective as a water quality criterion for purposes of CWA Section 303(c) and it cannot be used for issuing certifications under CWA Section 401, permits under CWA Section 402, or total maximum daily loads under CWA section 303(d).

(3) For any new waste sources, alternatives that utilize reuse or disposal with no discharge to public waters must be given highest priority for use wherever practicable. New source discharges may be approved subject to the criteria in OAR 340-041-0004(9).

(4) No discharges of wastes to lakes or reservoirs may be allowed except as provided in section OAR 340-041-0004(9).

(5) Log handling in public waters must conform to current Commission policies and guidelines.

(6) Sand and gravel removal operations must be conducted pursuant to a permit from the Division of State Lands and separated from the active flowing stream by a watertight berm wherever physically practicable. Recirculation and reuse of process water must be required wherever practicable. Discharges or seepage or leakage losses to public waters may not cause a violation of water quality standards or adversely affect legitimate beneficial uses.

(7) Road building and maintenance activities must be conducted in a manner so as to keep waste materials out of public waters and minimize erosion of cut banks, fills, and road surfaces.

(8) In order to improve controls over nonpoint sources of pollution, federal, State, and local resource management agencies will be encouraged and assisted to coordinate planning and implementation of programs to regulate or control runoff, erosion, turbidity, stream temperature, stream flow, and the withdrawal and use of irrigation water on a basin-wide approach so as to

protect the quality and beneficial uses of water and related resources. Such programs may include, but not be limited to, the following:

(a) Development of projects for storage and release of suitable quality waters to augment low stream flow;

(b) Urban runoff control to reduce erosion;

(c) Possible modification of irrigation practices to reduce or minimize adverse impacts from irrigation return flows;

(d) Stream bank erosion reduction projects; and

(e) Federal water quality restoration plans.

(9) The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or that are injurious to health, recreation, or industry may not be allowed;

(10) The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish may not be allowed;

(11) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry may not be allowed;

(12) Objectionable discoloration, scum, oily sheens, or floating solids, or coating of aquatic life with oil films may not be allowed;

(13) Aesthetic conditions offensive to the human senses of sight, taste, smell, or touch may not be allowed;

(14) Radioisotope concentrations may not exceed maximum permissible concentrations (MPC's) in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products, or pose an external radiation hazard;

(15) Minimum Design Criteria for Treatment and Control of Wastes. Except as provided in OAR 340-041-0101 through 340-041-0350, and subject to the implementation requirements set forth in OAR 340-041-0061, prior to discharge of any wastes from any new or modified facility to any waters of the State, such wastes must be treated and controlled in facilities designed in accordance with the following minimum criteria.

(a) In designing treatment facilities, average conditions and a normal range of variability are generally used in establishing design criteria. A facility once completed and placed in operation

should operate at or near the design limit most of the time but may operate below the design criteria limit at times due to variables which are unpredictable or uncontrollable. This is particularly true for biological treatment facilities. The actual operating limits are intended to be established by permit pursuant to ORS 468.740 and recognize that the actual performance level may at times be less than the design criteria.

(A) Sewage wastes:

(i) Effluent BOD concentrations in mg/l, divided by the dilution factor (ratio of receiving stream flow to effluent flow) may not exceed one unless otherwise approved by the Commission;

(ii) Sewage wastes must be disinfected, after treatment, equivalent to thorough mixing with sufficient chlorine to provide a residual of at least 1 part per million after 60 minutes of contact time unless otherwise specifically authorized by permit;

(iii) Positive protection must be provided to prevent bypassing raw or inadequately treated sewage to public waters unless otherwise approved by the Department where elimination of inflow and infiltration would be necessary but not presently practicable; and

(iv) More stringent waste treatment and control requirements may be imposed where special conditions make such action appropriate.

(B) Industrial wastes:

(i) After maximum practicable in-plant control, a minimum of secondary treatment or equivalent control (reduction of suspended solids and organic material where present in significant quantities, effective disinfection where bacterial organisms of public health significance are present, and control of toxic or other deleterious substances);

(ii) Specific industrial waste treatment requirements may be determined on an individual basis in accordance with the provisions of this plan, applicable federal requirements, and the following:

(I) The uses that are or may likely be made of the receiving stream;

(II) The size and nature of flow of the receiving stream;

(III) The quantity and quality of wastes to be treated; and

(IV) The presence or absence of other sources of pollution on the same watershed.

(iii) Where industrial, commercial, or agricultural effluents contain significant quantities of potentially toxic elements, treatment requirements may be determined utilizing appropriate bioassays;

(iv) Industrial cooling waters containing significant heat loads must be subjected to off-stream cooling or heat recovery prior to discharge to public waters;

(v) Positive protection must be provided to prevent bypassing of raw or inadequately treated industrial wastes to any public waters;

(vi) Facilities must be provided to prevent and contain spills of potentially toxic or hazardous materials.

Stat. Auth.: ORS 468.020, 468B.030, 468B.035, 468B.048
Stats. Implemented: ORS 468B.030, 468B.035, 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03; DEQ 2-2007, f. & cert. ef. 3-15-07; DEQ 10-2011, f. & cert. ef. 7-13-11; DEQ 5-2013, f. & cert. ef. 6-21-13

340-041-0028

Temperature

(1) Background. Water temperatures affect the biological cycles of aquatic species and are a critical factor in maintaining and restoring healthy salmonid populations throughout the State. Water temperatures are influenced by solar radiation, stream shade, ambient air temperatures, channel morphology, groundwater inflows, and stream velocity, volume, and flow. Surface water temperatures may also be warmed by anthropogenic activities such as discharging heated water, changing stream width or depth, reducing stream shading, and water withdrawals.

(2) Policy. It is the policy of the Commission to protect aquatic ecosystems from adverse warming and cooling caused by anthropogenic activities. The Commission intends to minimize the risk to cold-water aquatic ecosystems from anthropogenic warming, to encourage the restoration and protection of critical aquatic habitat, and to control extremes in temperature fluctuations due to anthropogenic activities. The Commission recognizes that some of the State's waters will, in their natural condition, not provide optimal thermal conditions at all places and at all times that salmonid use occurs. Therefore, it is especially important to minimize additional warming due to anthropogenic sources. In addition, the Commission acknowledges that control technologies, best management practices and other measures to reduce anthropogenic warming are evolving and that the implementation to meet these criteria will be an iterative process. Finally, the Commission notes that it will reconsider beneficial use designations in the event that man-made obstructions or barriers to anadromous fish passage are removed and may justify a change to the beneficial use for that water body.

(3) Purpose. The purpose of the temperature criteria in this rule is to protect designated temperature-sensitive, beneficial uses, including specific salmonid life cycle stages in waters of the State.

(4) Biologically Based Numeric Criteria. Unless superseded by the natural conditions criteria described in section (8) of this rule, or by subsequently adopted site-specific criteria approved by EPA, the temperature criteria for State waters supporting salmonid fishes are as follows:

(a) The seven-day-average maximum temperature of a stream identified as having salmon and steelhead spawning use on subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Tables 101B, and 121B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, may not exceed 13.0 degrees Celsius (55.4 degrees Fahrenheit) at the times indicated on these maps and tables;

(b) The seven-day-average maximum temperature of a stream identified as having core cold water habitat use on subbasin maps set out in OAR 340-041-101 to 340-041-340: Figures 130A, 151A, 160A, 170A, 180A, 201A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit);

(c) The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit);

(d) The seven-day-average maximum temperature of a stream identified as having a migration corridor use on subbasin maps and tables OAR 340-041-0101 to 340-041-0340: Tables 101B, and 121B, and Figures 151A, 170A, 300A, and 340A, may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit). In addition, these water bodies must have coldwater refugia that are sufficiently distributed so as to allow salmon and steelhead migration without significant adverse effects from higher water temperatures elsewhere in the water body. Finally, the seasonal thermal pattern in Columbia and Snake Rivers must reflect the natural seasonal thermal pattern;

(e) The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or redband trout use on subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Tables 121B, 140B, 190B, and 250B, and Figures 180A, 201A, 260A and 310A may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit);

(f) The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130B, 151B, 160B, 170B, 180A, 201A, 260A, 310B, and 340B, may not exceed 12.0 degrees Celsius (53.6 degrees Fahrenheit). From August 15 through May 15, in bull trout spawning waters below Clear Creek and Mehlhorn reservoirs on Upper Clear Creek (Pine Subbasin), below Laurance Lake on the Middle Fork Hood River, and below Carmen reservoir on the Upper McKenzie River, there may be no more than a 0.3 degrees Celsius (0.5 Fahrenheit) increase between the water temperature immediately upstream of the reservoir and the water temperature immediately downstream of the spillway when the ambient seven-day-average maximum stream temperature is 9.0 degrees Celsius (48 degrees Fahrenheit) or greater, and no

more than a 1.0 degree Celsius (1.8 degrees Fahrenheit) increase when the seven-day-average stream temperature is less than 9 degrees Celsius.

(5) Unidentified Tributaries. For waters that are not identified on the "Fish Use Designations" maps referenced in section (4) of this rule, the applicable criteria for these waters are the same criteria as is applicable to the nearest downstream water body depicted on the applicable map. This section (5) does not apply to the "Salmon and Steelhead Spawning Use Designations" maps.

(6) Natural Lakes. Natural lakes may not be warmed by more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) above the natural condition unless a greater increase would not reasonably be expected to adversely affect fish or other aquatic life. Absent a discharge or human modification that would reasonably be expected to increase temperature, DEQ will presume that the ambient temperature of a natural lake is the same as its natural thermal condition.

(7) Oceans and Bays. Except for the Columbia River above river mile 7, ocean and bay waters may not be warmed by more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) above the natural condition unless a greater increase would not reasonably be expected to adversely affect fish or other aquatic life. Absent a discharge or human modification that would reasonably be expected to increase temperature, DEQ will presume that the ambient temperature of the ocean or bay is the same as its natural thermal condition.

(8) Natural Conditions Criteria. Where the department determines that the natural thermal potential of all or a portion of a water body exceeds the biologically-based criteria in section (4) of this rule, the natural thermal potential temperatures supersede the biologically-based criteria, and are deemed to be the applicable temperature criteria for that water body.

NOTE: On August 8, 2013, the Environmental Protection Agency disapproved rule section OAR 340-041-0028(8). Consequently, section (8) is no longer effective as a water quality criterion for purposes of CWA Section 303(c) and it cannot be used for issuing certifications under CWA Section 401, permits under CWA Section 402, or total maximum daily loads under CWA section 303(d).

(9) Cool Water Species.

(a) No increase in temperature is allowed that would reasonably be expected to impair cool water species. Waters of the State that support cool water species are identified on subbasin tables and figures set out in OAR 340-041-0101 to 340-041-0340; Tables 140B, 190B and 250B, and Figures 180A, 201A and 340A.

(b) See OAR 340-041-0185 for a basin specific criterion for the Klamath River.

(10) Borax Lake Chub. State waters in the Malheur Lake Basin supporting the Borax Lake chub may not be cooled more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) below the natural condition.

(11) Protecting Cold Water.

(a) Except as described in subsection (c) of this rule, waters of the State that have summer seven-day-average maximum ambient temperatures that are colder than the biologically based criteria in section (4) of this rule, may not be warmed by more than 0.3 degrees Celsius (0.5 degrees Fahrenheit) above the colder water ambient temperature. This provision applies to all sources taken together at the point of maximum impact where salmon, steelhead or bull trout are present.

(b) A point source that discharges into or above salmon & steelhead spawning waters that are colder than the spawning criterion, may not cause the water temperature in the spawning reach where the physical habitat for spawning exists during the time spawning through emergence use occurs, to increase more than the following amounts after complete mixing of the effluent with the river:

(A) If the rolling 60 day average maximum ambient water temperature, between the dates of spawning use as designated under subsection (4)(a) of this rule, is 10 to 12.8 degrees Celsius, the allowable increase is 0.5 Celsius above the 60 day average; or

(B) If the rolling 60 day average maximum ambient water temperature, between the dates of spawning use as designated under subsection (4)(a) of this rule, is less than 10 degrees Celsius, the allowable increase is 1.0 Celsius above the 60 day average, unless the source provides analysis showing that a greater increase will not significantly impact the survival of salmon or steelhead eggs or the timing of salmon or steelhead fry emergence from the gravels in downstream spawning reach.

(c) The cold water protection narrative criteria in subsection (a) do not apply if:

(A) There are no threatened or endangered salmonids currently inhabiting the water body;

(B) The water body has not been designated as critical habitat; and

(C) The colder water is not necessary to ensure that downstream temperatures achieve and maintain compliance with the applicable temperature criteria.

(12) Implementation of the Temperature Criteria.

(a) Minimum Duties. There is no duty for anthropogenic sources to reduce heating of the waters of the State below their natural condition. Similarly, each anthropogenic point and nonpoint source is responsible only for controlling the thermal effects of its own discharge or activity in accordance with its overall heat contribution. In no case may a source cause more warming than that allowed by the human use allowance provided in subsection (b) of this rule.

(b) Human Use Allowance. Insignificant additions of heat are authorized in waters that exceed the applicable temperature criteria as follows:

(A) Prior to the completion of a temperature TMDL or other cumulative effects analysis, no single NPDES point source that discharges into a temperature water quality limited water may cause the temperature of the water body to increase more than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after mixing with either twenty five (25) percent of the stream flow, or the temperature mixing zone, whichever is more restrictive; or

(B) Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact.

(C) Point sources must be in compliance with the additional mixing zone requirements set out in OAR 340-041-0053(2)(d).

(D) A point source in compliance with the temperature conditions of its NPDES permit is deemed in compliance with the applicable criteria.

(c) Air Temperature Exclusion. A water body that only exceeds the criteria set out in this rule when the exceedance is attributed to daily maximum air temperatures that exceed the 90th percentile value of annual maximum seven-day average maximum air temperatures calculated using at least 10 years of air temperature data, will not be listed on the section 303(d) list of impaired waters and sources will not be considered in violation of this rule.

(d) Low Flow Conditions. An exceedance of the biologically-based numeric criteria in section (4) of this rule, or an exceedance of the natural condition criteria in section (8) of this rule will not be considered a permit violation during stream flows that are less than the 7Q10 low flow condition for that water body.

(e) Other Nonpoint Sources. The department may, on a case-by-case basis, require nonpoint sources (other than forestry and agriculture), including private hydropower facilities regulated by a 401 water quality certification, that may contribute to warming of State waters beyond 0.3 degrees Celsius (0.5 degrees Fahrenheit), and are therefore designated as water-quality limited, to develop and implement a temperature management plan to achieve compliance with applicable temperature criteria or an applicable load allocation in a TMDL pursuant to OAR 340-042-0080.

(A) Each plan must ensure that the nonpoint source controls its heat load contribution to water temperatures such that the water body experiences no more than a 0.3 degrees Celsius (0.5 degree Fahrenheit) increase above the applicable criteria from all sources taken together at the maximum point of impact.

(B) Each plan must include a description of best management practices, measures, effluent trading, and control technologies (including eliminating the heat impact on the stream) that the nonpoint source intends to use to reduce its temperature effect, a monitoring plan, and a compliance schedule for undertaking each measure.

(C) The Department may periodically require a nonpoint source to revise its temperature management plan to ensure that all practical steps have been taken to mitigate or eliminate the temperature effect of the source on the water body.

(f) Compliance Methods. Anthropogenic sources may engage in thermal water quality trading in whole or in part to offset its temperature discharge, so long as the trade results in at least a net thermal loading decrease in anthropogenic warming of the water body, and does not adversely affect a threatened or endangered species. Sources may also achieve compliance, in whole or in part, by flow augmentation, hyporheic exchange flows, outfall relocation, or other measures that reduce the temperature increase caused by the discharge.

(g) Release of Stored Water. Stored cold water may be released from reservoirs to cool downstream waters in order to achieve compliance with the applicable numeric criteria. However, there can be no significant adverse impact to downstream designated beneficial uses as a result of the releases of this cold water, and the release may not contribute to violations of other water quality criteria. Where the Department determines that the release of cold water is resulting in a significant adverse impact, the Department may require the elimination or mitigation of the adverse impact.

(13) Site-Specific Criteria. The Department may establish, by separate rulemaking, alternative site-specific criteria for all or a portion of a water body that fully protects the designated use.

(a) These site-specific criteria may be set on a seasonal basis as appropriate.

(b) The Department may use, but is not limited by the following considerations when calculating site-specific criteria:

(A) Stream flow;

(B) Riparian vegetation potential;

(C) Channel morphology modifications;

(D) Cold water tributaries and groundwater;

(E) Natural physical features and geology influencing stream temperatures; and

(F) Other relevant technical data.

(c) DEQ may consider the thermal benefit of increased flow when calculating the site-specific criteria.

(d) Once established and approved by EPA, the site-specific criteria will be the applicable criteria for the water bodies affected.

[ED. NOTE: Tables referenced are available from the agency.]

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03; DEQ 1-2007, f. & cert. ef. 3-14-07; DEQ 2-2007, f. & cert. ef. 3-15-07; DEQ 10-2011, f. & cert. ef. 7-13-11; DEQ 5-2013, f. & cert. ef. 6-21-13

340-041-0033

Toxic Substances

~~(1)~~ **Effectiveness.** Amendments to ~~sections (1-5) and (7) of~~ this rule ~~(OAR 340-041-0033)~~ and associated revisions to Table~~s~~ 30 under OAR 340-041-8033 ~~20, 33A, 33B, 33C, and 40~~ do not become ~~effective on April 18, 2014. The amendments do not become~~ applicable for purposes of ORS chapter 468B or the federal Clean Water Act~~, however, unless approved by EPA pursuant to~~ until EPA approves the revisions it identifies as water quality standards according to 40 CFR 131.21 (4/27/2000).

(1~~2~~) **Toxic Substances Narrative**. Toxic substances may not be introduced above natural background levels in waters of the state in amounts, concentrations, or combinations that may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely affect public health, safety, or welfare or aquatic life, wildlife~~,~~ or other designated beneficial uses.

(2~~3~~) **Aquatic Life Numeric Criteria**. Levels of toxic substances in waters of the state may not exceed the applicable aquatic life criteria listed in ~~Table 30~~Table 30 under OAR 340-041-8033.

(3~~4~~) **Human Health Numeric Criteria**. The criteria for waters of the state listed in ~~Table 40~~Table 40 under OAR 340-041-8033 are established to protect Oregonians from potential adverse health effects associated with long-term exposure to toxic substances associated with consumption of fish, shellfish~~,~~ and water.

(4~~5~~) To establish permit or other regulatory limits for toxic substances ~~for which~~without criteria ~~are not included~~ in ~~Table 30~~Table 30 under OAR 340-041-8033 or ~~Table 40~~Table 40 under OAR 340-041-8033, ~~the department~~DEQ may use the guidance values in ~~Table 31~~Table 31 under

OAR 340-041-8033, public health advisories, and ~~other~~ published scientific literature. ~~The department~~DEQ may also require or conduct bio-assessment studies to monitor the toxicity to aquatic life of complex effluents, other suspected discharges~~,~~ or chemical substances without numeric criteria.

(5~~6~~) **Establishing Site-Specific Background Pollutant Criteria**: This provision is a performance based water quality standard that results in site-specific human health water quality criteria under the conditions and procedures specified in this rule section. It addresses existing permitted discharges of a pollutant removed from the same body of water. For waterbodies where a discharge does not increase the pollutant's mass and does not increase the pollutant concentration by more than 3~~%~~ percent, and where the water body meets a pollutant concentration associated with a risk level of 1 x 10-4, DEQ concludes that the pollutant concentration continues to protect human health.

(a) Definitions: As used in this section:

~~, For the purpose of this section (OAR 340-041-0033(6), this section):~~

(A) "Background pollutant concentration" means the ambient water body concentration immediately upstream of the discharge, regardless of whether those pollutants are natural or result from upstream human activity.

(B) An "intake pollutant" is the amount of a pollutant ~~that is~~ present in ~~public~~ waters of the state (including groundwater) as provided in subsection (C), below, at the time it is withdrawn from such waters by the discharger or other facility supplying the discharger with intake water.

(C) "Same body of water": An intake pollutant is considered to be from the "same body of water" as the discharge if ~~the department~~DEQ finds that the intake pollutant would have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee. To make t~~T~~his finding, DEQ requires information showing that ~~may be deemed established if~~:

(i) The background concentration of the pollutant in the receiving water (excluding any amount of the pollutant in the facility's discharge) is similar to that in the intake water; and,

(ii) There is a direct hydrological connection between the intake and discharge points.~~; and~~

(I) ~~The department~~DEQ may also consider other site-specific factors relevant to the transport and fate of the pollutant to make the finding in a particular case that a pollutant would or would not have reached the vicinity of the outfall point in the receiving water within a reasonable period had it not been removed by the permittee.

(II) An intake pollutant from groundwater may be considered to be from the "same body of water" if ~~the department~~DEQ determines that the pollutant would have reached the vicinity of

the outfall point in the receiving water within a reasonable period had it not been removed by the permittee.~~,~~ ~~except that such a~~A pollutant is not from the same body of water if the groundwater contains the pollutant partially or entirely due to past or present human activity, such as industrial, commercial, or municipal operations, disposal actions, or treatment processes.

(iii) Water quality characteristics (e.g., temperature, pH, hardness) are similar in the intake and receiving waters.

(b) Applicability

(A) DEQ may establish s~~S~~ite-specific criteria ~~may be established~~ under this rule section only for carcinogenic pollutants.

(B) Site-specific criteria established under this rule section apply in the vicinity of the discharge for purposes of establishing permit limits for the specified permittee.

(C) The underlying waterbody criteria continue to apply for all other Clean Water Act programs.

(D) The site-specific background pollutant criterion will be effective upon ~~department~~ DEQ issuance of the permit for the specified permittee.

(E) DEQ will reevaluate a~~A~~ny site-specific criteria developed under this procedure ~~will be re-evaluated~~ upon permit renewal.

(c) DEQ may establish ~~A~~a site-specific background pollutant criterion ~~may be established where~~ when all of the following conditions are met:

(A) The discharger has a currently effective NPDES permit;

(B) The mass of the pollutant discharged to the receiving waterbody does not exceed the mass of the intake pollutant from the same body of water, as defined in section (5~~6~~)(a)(C) above, and~~,~~ therefore~~,~~ does not increase the total mass load of the pollutant in the receiving water body;

(C) DEQ has not assigned t~~T~~he discharger ~~has not been assigned~~ a TMDL wasteload allocation for the pollutant in question;

(D) The permittee uses any feasible pollutant reduction measures available and known to minimize the pollutant concentration in their discharge;

(E) The pollutant discharge has not been chemically or physically altered in a manner that causes adverse water quality impacts that would not occur if the intake pollutants were left in-stream; and,

(F) The timing and location of the pollutant discharge would not cause adverse water quality impacts that would not occur if the intake pollutant were left in-stream.

(d) The site-specific background pollutant criterion must be the most conservative of the following four values. The procedures deriving these values are described in the sections (5~~6~~)(e) of this rule.

(A) The projected in-stream pollutant concentration resulting from the current discharge concentration and any feasible pollutant reduction measures under (c)(D) above, after mixing with the receiving stream.

(B) The projected in-stream pollutant concentration resulting from the portion of the current discharge concentration associated with the intake pollutant mass after mixing with the receiving stream. This analysis ensures that there will be no increase in the mass of the intake pollutant in the receiving water body as required by condition (c)(B) above.

(C) The projected in-stream pollutant concentration associated with a 3~~%~~ percent increase above the background pollutant concentration as calculated:

(i) For the main stem Willamette and Columbia Rivers, using 25~~%~~ percent of the harmonic mean flow of the waterbody.

(ii) For all other waters, using 100~~%~~ percent of the harmonic mean flow or similar critical flow value of the waterbody.

(D) A criterion concentration value representing a human health risk level of 1 x 10-4. DEQ calculates t~~T~~his value ~~is calculated~~ using EPA's human health criteria derivation equation for carcinogens (EPA 2000), a risk level of 1 x 10-4, and the same values for the remaining calculation variables that were used to derive the underlying human health criterion.

(e) Procedure to derive a site-specific human health water quality criterion to address a background pollutant:

(A) ~~The department~~DEQ will develop a flow-weighted characterization of the relevant flows and pollutant concentrations of the receiving waterbody, effluent and all facility intake pollutant sources to determine the fate and transport of the pollutant mass.

(i) The pollutant mass in the effluent discharged to a receiving waterbody may not exceed the mass of the intake pollutant from the same body of water.

(ii) Where a facility discharges intake pollutants from multiple sources that originate from the receiving waterbody and from other waterbodies, ~~the department~~DEQ will calculate the flow-weighted amount of each source of the pollutant in the characterization.

(iii) Where a municipal water supply system provides intake water for a facility ~~is provided by a municipal water supply system~~ and the supplier provides treatment of the raw water that removes an intake water pollutant, the concentration and mass of the intake water pollutant ~~shall~~ must be determined at the point where the water enters the water supplier's distribution system.

(B) Using the flow weighted characterization developed in Section (56)(e)(A), ~~the department~~DEQ will calculate the in-stream pollutant concentration following mixing of the discharge into the receiving water. DEQ will use the ~~The~~ resultant concentration ~~will be used~~ to determine the conditions in Section (56)(d)(A) and (B).

(C) Using the ~~flow weighted~~flow-weighted characterization, ~~the department~~DEQ will calculate the in-stream pollutant concentration based on an increase of 3~~%~~ percent above background pollutant concentration. DEQ will use the ~~The~~ resultant concentration ~~will be used~~ to determine the condition in Section (56)(d)(C).

(i) For the main stem Willamette and Columbia Rivers, DEQ will use 25~~%~~ percent of the harmonic mean flow of the waterbody ~~will be used~~.

(ii) For all other waters, DEQ will use 100~~%~~ percent of the harmonic mean flow or similar critical flow value of the waterbody ~~will be used~~.

(D) ~~The department~~DEQ will select the most conservative of the following values as the site-specific water quality criterion.

(i) The projected in-stream pollutant concentration described in Section (56)(e)(B);

(ii) The in-stream pollutant concentration based on an increase of 3~~%~~ percent above background described in Section (56)(e)(C); or

(iii) A water quality criterion based on a risk level of 1 x 10-4.

(f) Calculation of water quality based effluent limits based on a site-specific background pollutant criterion:

(A) For discharges to receiving waters with a site-specific background pollutant criterion, ~~the department~~DEQ will use the site-specific criterion in the calculation of a numeric water quality based effluent limit.

(B) ~~The department~~DEQ will compare the calculated water quality based effluent limits to any applicable aquatic toxicity or technology based effluent limits and select the most conservative for inclusion in the permit conditions.

(g) In addition to the water quality based effluent limits described in Section (56)(f), ~~the department~~DEQ will calculate a mass-based limit where necessary to ensure that the condition described in Section (56)(c)(B) is met. Where mass-based limits are included, the permit ~~shall~~ will specify how DEQ will assess compliance with mass-based effluent limitations ~~will be assessed~~.

(h) The permit shall include a provision requiring ~~the department~~DEQ to consider the re-opening of the permit and re-evaluation of the site-specific background pollutant criterion if new

information shows the discharger no longer meets the conditions described in subsections (56)(c) and (e).

(i) Public Notification Requirements.

(A) If ~~the department~~DEQ proposes to grant a site-specific background pollutant criterion, it must provide public notice of the proposal and hold a public hearing. The public notice may be included in the public notification of a draft NPDES permit or other draft regulatory decision that would rely on the criterion and will also be published on ~~the~~ DEQ's water quality standards website;

(B) ~~The department~~DEQ will publish a list of all site-specific background pollutant criteria approved ~~pursuant~~ according to this rule. DEQ will add ~~A~~the criterion ~~will be added~~ to this list within 30 days of its effective date. The list will identify~~:~~ the:

(i) ~~p~~Permittee;

(ii) ~~the s~~Site-specific background pollutant criterion and the associated risk level;

(iii) ~~the w~~Waterbody to which the criterion applies;

(iv) ~~the a~~Allowable pollutant effluent limit; and

(v) ~~h~~How to obtain additional information about the criterion.

(67**) Arsenic Reduction Policy**: The inorganic arsenic criterion for the protection of human health from the combined consumption of organisms and drinking water is 2.1 micrograms per liter. While this criterion is protective of human health and more stringent than the federal maximum contaminant level (MCL) for arsenic in drinking water, which is 10 micrograms per liter, it ~~nonetheless~~ is based on a higher risk level than ~~the Commission~~EQC ~~has~~ used to establish other human health criteria. This higher risk level recognizes that much of the risk is due to naturally high levels of inorganic arsenic in Oregon's waterbodies. In order to maintain the lowest human health risk from inorganic arsenic in drinking water, ~~the Commission~~EQC ~~has~~ determined that it is appropriate to adopt the following policy to limit the human contribution to that risk.

~~(a) The arsenic reduction policy established by this rule section does not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act unless and until the numeric arsenic criteria established by this rule are approved by EPA pursuant to 40 CFR 131.21 (4/27/2000).~~

(a~~b~~) It is ~~the policy of the Commission~~EQC policy to reduce ~~that~~ the addition of inorganic arsenic from new or existing anthropogenic sources to waters of the state within a surface water drinking water protection area ~~be reduced~~ to the maximum amount feasible. The requirements of this rule section (OAR 340-041-0033(67)) apply to sources that discharge to surface waters of

the state with an ambient inorganic arsenic concentration equal to or lower than the applicable numeric inorganic arsenic criteria for the protection of human health.

(bc) Definitions. As used in this section:

. The following definitions apply to this section (OAR 340-041-0033(7)):

(A) "Add inorganic arsenic" means to discharge a net mass of inorganic arsenic from a point source (the mass of inorganic arsenic discharged minus the mass of inorganic arsenic taken into the facility from a surface water source).

(B) A "surface water drinking water protection area," for the purpose of this section, means an area delineated as such by DEQ under the source water assessment program of the federal Safe Drinking Water Act, 42 U.S.C. §? 300j 13. DEQ delineates Thethese areas are delineated for the purpose of to protecting public or community drinking water supplies that use surface water sources. These delineations can be found atare on DEQ's drinking water program websiteWeb page.

(C) "Potential to significantly increase inorganic arsenic concentrations in the public drinking water supply source water" means:

(i) for a discharge towill increase the concentration of inorganic arsenic in the receiving water for a discharge by 10 percent or more after mixing with the harmonic mean flow of the receiving water; or

(ii) as an alternative, if sufficient data are available, the discharge will increase the concentration of inorganic arsenic in the surface water intake water of a public water system by 0.021 micrograms per liter or more based on a mass balance calculation.

(cd) Following the effective date of this rule, applications for an individual NPDES permit or permit renewal received from industrial dischargers located in a surface water drinking water protection area and identified by DEQ as likely to add inorganic arsenic to the receiving water must include sufficient data to enable DEQ to determine whether:

(A) The discharge in fact adds inorganic arsenic; and

(B) The discharge has the potential to significantly increase inorganic arsenic concentrations in the public drinking water supply source water.

(de) Where DEQ determines that both conditions in subsection (cd) of this section (67) are true, the industrial discharger must develop an inorganic arsenic reduction plan and propose all feasible measures to reduce its inorganic arsenic loading to the receiving water. The proposed plan, including proposed measures, monitoring and reporting requirements, and a schedule for those actions, will be described in the fact sheet and incorporated into the source's NPDES

permit after public comment and DEQ review and approval. In developing the plan, the source must:

(A) Identify how much it can minimize its inorganic arsenic discharge through pollution prevention measures, process changes, wastewater treatment, alternative water supply ~~(~~for groundwater users~~),~~ or other possible pollution prevention and~~/or~~ control measures;

(B) Evaluate the costs, feasibility and environmental impacts of the potential inorganic arsenic reduction and control measures;

(C) Estimate the predicted reduction in inorganic arsenic and the reduced human health risk expected to result from the control measures;

(D) Propose specific inorganic arsenic reduction or control measures, if feasible, and an implementation schedule; and

(E) Propose monitoring and reporting requirements to document progress in plan implementation and the inorganic arsenic load reductions.

(c~~f~~) In order to implement this section, DEQ will develop the following information and guidance within 120 days of the effective date of this rule and periodically update it as warranted by new information:

(A) A list of industrial sources or source categories, including industrial stormwater and sources covered by general permits~~, that are~~ likely to add inorganic arsenic to surface waters of the ~~State~~state.

~~(i)~~ For industrial sources or source categories permitted under a general permit that have been identified by DEQ as likely sources of inorganic arsenic, DEQ will evaluate options for reducing inorganic arsenic during permit renewal or evaluation of Stormwater Pollution Control Plans.

(B) Quantitation limits for monitoring inorganic arsenic concentrations.

(C) Information and guidance to assist sources in estimating, ~~pursuant~~ according to subsection (d~~e~~)(C) of this section, the reduced human health risk expected to result from inorganic arsenic control measures based on the most current EPA risk assessment.

(f~~g~~) It is the policy of ~~the Commission~~EQC that landowners engaged in agricultural or development practices on land where pesticides, fertilizers, or soil amendments containing arsenic are currently being or have previously been applied, implement conservation practices to minimize the erosion and runoff of inorganic arsenic to waters of the ~~State~~ state or to a location where such material could readily migrate into waters of the ~~State~~state.

~~[ED. NOTE: Tables referenced are not included in rule text. Click here for PDF copy of table(s).]~~

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03; DEQ 3-2004, f. & cert. ef. 5-28-04; DEQ 17-2010, f. & cert. ef. 12-21-10; DEQ 8-2011, f. & cert. ef. 6-30-11; DEQ 10-2011, f. & cert. ef. 7-13-11; DEQ 17-2013, f. 12-23-13, cert. ef. 4-18-14

340-041-0124

Water Quality Standards and Policies Specific to the Main Stem Snake River

(1) pH (hydrogen ion concentration). pH values may not fall outside the following range: main stem Snake River ~~(river miles 260 to 335)~~: 7.0-9.0.

(2) Total Dissolved Solids. Guide concentration listed below may not be exceeded unless otherwise specifically authorized by DEQ upon such conditions as it may deem necessary to carry out the general intent of this plan and to protect the beneficial uses set forth in OAR 340-041-0120: main stem Snake River -- 750.0 mg/l.

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03

340-041-0310

Beneficial Uses to Be Protected in the Umatilla Basin

(1) Water quality in the Umatilla Basin (see Figure 1) must be managed to protect the designated beneficial uses shown in Table 310A (~~April 2012~~January 2015).

(2) Designated fish uses to be protected in the Umatilla Basin are shown in Figures 310A and 310B (November 2003, except as noted in Table 310A).

[ED. NOTE: Tables referenced are not included in rule text. Click here for PDF copy of table(s).]

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03; DEQ 3-2012, f. & cert. ef. 5-21-12

Table 310A – Designated Beneficial Uses –Umatilla Basin 340-041-0310				
Beneficial Uses	Umatilla Subbasin	Willow Creek Subbasin	West Division Main Canal – constructed channel[3]	West Division Main Canal – overflow channels[3]
Public Domestic Water Supply[1]	X	X		
Private Domestic Water Supply[1]	X	X		
Industrial Water Supply	X	X	X	X
Irrigation	X	X	X	X
Livestock Watering	X	X	X	X
Fish & Aquatic Life[2]	X	X		X
~~Modified Aquatic Habitat~~				~~X~~
Wildlife & Hunting	X	X	X	X
Fishing	X	X		X
Boating	X	X (at mouth)		
Water Contact Recreation	X	X	X	X
Aesthetic Quality	X	X	X	X
Hydro Power	X	X	X	X
Commercial Navigation & Transportation				
[1]With adequate pretreatment (filtration & disinfection) and natural quality to meet drinking water standards.				
[2]See also Figures 310A and 310B for fish use designations for this basin. Note: The fish & aquatic life use designations for the "constructed channel" segment of the West Division Main Canal in this table supersede Figure 310A, which incorrectly identifies Redband trout use in that portion of the canal.				
[3]The West Division Main Canal extends from the point of diversion from the Umatilla River to the confluence with the Columbia River. The canal consists of two segments. The constructed channel segment extends from the Umatilla River 27 miles down gradient to the flow control gate at the end of the concrete structure as it was originally built (concrete-lining was later added to parts of the overflow channels)~~–~~. The overflow channels segment extends from the lower end of the constructed channel to the outflow to the Columbia River.				

Table revised ~~April 2012~~ January 2015

340-041-0315

Water Quality Standards and Policies for this Basin

(1) pH (hydrogen ion concentration). pH values may not fall outside the following range: all Basin streams ~~(other than~~except the main stem Columbia River and the "~~overflow~~constructed channels~~s~~" segment of the West Division Main Canal~~)~~: 6.5-9.0. When ~~greater~~ more than 25 percent of ambient measurements taken between June and September are greater than pH 8.7, and as resources are available according to priorities set by ~~the Department~~DEQ, ~~the Department~~DEQ will determine whether the values higher than 8.7 are anthropogenic or natural in origin.

(2) The following criteria apply to the "constructed channel" segment of the West Division Main Canal and supersede the water quality standards in OAR 340-041-0011 through 340-041-0036 for the "constructed channel" segment of the canal. ~~:~~ The criteria in (b) and (c) also apply to the "overflow channels" segment of the West Division Main Canal.

(a) Canal waters may not exceed the numeric criteria shown in Table 315~~. These criteria apply~~ from the uppermost irrigation withdrawal to the ~~confluence with the Columbia River~~ end of the "constructed channel" segment of the canal~~;~~.

(b) Toxic substances ~~shall~~ must not be present in canal waters in amounts ~~that are~~ likely to singularly or in combination harm the designated beneficial uses of the canal or downstream waters. ~~The presence of substances at naturally occurring levels shall not be considered harmful to the designated uses;~~

(c) Sediment load and particulate size shall not exceed levels that interfere with irrigation or the other designated beneficial uses of the canal;

~~(d) The dissolved oxygen criteria contained in OAR 340-041-0016 (4) apply to "overflow channels" segment of the canal to protect the "modified aquatic habitat" use.~~

~~(e)~~(d) pH values ~~in the "constructed channel" segment of the canal~~ may not fall outside the range of 4.5 to 9.0.

~~(f) pH values in the "overflow channels" segment of the canal may not fall outside the range of 6.5 to 9.0 in order to protect the "modified aquatic habitat" use.~~

(3) Minimum Design Criteria for Treatment and control of Sewage Wastes in this Basin:

(a) During periods of low stream flows (approximately April 1 to October 31): Treatment resulting in monthly average effluent concentrations not to exceed 20 mg/l of BOD and 20 mg/l of SS or equivalent control;

(b) During the period of high stream flows (approximately November 1 to April 30): A minimum of secondary treatment or equivalent control and unless otherwise specifically authorized by ~~the Department~~DEQ, operation of all waste treatment and control facilities at maximum practicable efficiency and effectiveness so as to minimize waste discharges to public waters.

[ED. NOTE: Tables referenced are not included in rule text. Click here for PDF copy of table(s).]

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 17-2003, f. & cert. ef. 12-9-03; DEQ 2-2007, f. & cert. ef. 3-15-07; DEQ 3-2012, f. & cert. ef. 5-21-12

Table 315

Water Quality Criteria
Constructed Channel Segment,
West Division Main Canal, Umatilla Basin

340-041-0315

Parameter	For Irrigation (mg/l, metals as dissolved)	For Livestock Watering (mg/l, metals as dissolved)
Total dissolved solids	450	
Arsenic (inorganic)	0.1	0.2
Beryllium	0.1	
Cadmium	0.01	0.05
Chromium	0.1	1
Copper	0.2	0.5
Lead	5	0.1
Mercury		0.01
Nickel	0.2	
Selenium	0.02	0.05
Zinc	2	25

Table revised January 2015

340-041-8033

Table 30: Aquatic Life Water Quality Criteria for Toxic Pollutants.

Table 31: Aquatic Life Water Quality Guidance Values for Toxic Pollutants.

Table 40: Human Health Water Quality Criteria for Toxic Pollutants.

The tables listed above in this rule are referenced in the water quality standards Toxics Substances Rule under OAR 340-041-0033. Please see the Toxics Substances Rule for important information about the applicability and content of these tables. Click here for a PDF copy of Tables 30, 31 and 40.

NOTE: In January 2015, the Environmental Quality Commission adopted revisions to Table 30 that revised the aquatic life freshwater criteria for ammonia. The Table 30 version accessed below reflects the revision to the- ammonia criteria including several other clarifications. **Revised Table 30 is not applicable for Clean Water Act purposes until EPA approves the revisions.** Click here for a PDF copy of revised Table 30.

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048

TABLE 30: Aquatic Life Water Quality Criteria for Toxic Pollutants

Effective XXXX~~April 18, 2014~~

Table not effective until EPA approval

Aquatic Life Criteria Summary

The concentration for each compound listed in Table 30 is a criterion not to be exceeded in waters of the state in order to protect aquatic life. The aquatic life criteria apply to waterbodies where the protection of fish and aquatic life ~~are~~ is ~~the~~ a designated use~~s~~. All values are expressed as micrograms per liter (µg/L). Compounds are listed in alphabetical order with the corresponding information: the Chemical Abstract Service (CAS) number, whether there is a human health criterion for the pollutant (i.e. "y"= yes, "n" = no), and the associated aquatic life freshwater and saltwater acute and chronic criteria. Italicized pollutants are not identified as priority pollutants by EPA. Dashes in the table column indicate that there is no aquatic life criterion.

Unless otherwise noted in the table below, the acute criterion is the Criterion Maximum Concentration (CMC) applied as a one-hour average concentration, and the chronic criterion is the Criterion Continuous Concentration (CCC) applied as a 96-hour (4 days) average concentration. The CMC and CCC criteria may ~~should~~ not be exceeded more than once every three years. Footnote A, associated with eleven pesticide pollutants in Table 30, describes the exception to the frequency and duration of the toxics criteria stated in this paragraph.

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

340-041-8033

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
1	Aldrin	309002	y	3 [A]	--	1.3 [A]	--

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

340-041-8033

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
2	*Alkalinity*		n	--	20,000 [B]	--	--
	[B] *Criterion shown is the minimum (i.e. CCC in water may not be below this value in order to protect aquatic life).*						
3	*Ammonia*	7664417	n	*The ammonia ~~C~~criteria are pH and~~,~~ temperature~~, and salmonid or sensitive coldwater species~~ dependent.—See ammonia criteria Tables 30(a)-(c) at end of Table 30.~~document USEPA January 1985 (Fresh Waters).~~* [M]	*The a~~A~~mmonia criteria ~~for saltwater may~~ are~~depend on~~ pH, ~~and~~ temperature and salinity dependent. Values for saltwater criteria (total ammonia) can be calculated from the tables specified in Ambient Water Quality Criteria for Ammonia (Saltwater)—1989 (EPA 440/5-88-004)~~;~~ ~~http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm)~~ See DEQ's calculator for calculating saltwater ammonia criteria at: http://www.deq.state.or.us/wq/standards/toxics.htm.*	
	[M] ~~*See expanded endnote M equations at bottom of Table 30 to calculate freshwater ammonia criteria.*~~ *The acute criteria in Table 30(a) apply in waterbodies where salmonids are a designated use in OAR 340-041-0101 through OAR 340-041-0340. The acute criteria in Table 30(b) apply in waterbodies where salmonids are not a designated use. The chronic criteria in Table 30(c) apply where fish and aquatic life is a designated use. It is not necessary to account for the presence or absence of salmonids or the presence of any early life stage of fish for the chronic criteria. Refer to DEQ's beneficial use website at: http://www.deq.state.or.us/wq/standards/uses.htm for additional information on salmonid beneficial use designations, including tables and maps.*						
4	Arsenic	7440382	y	340 [C, D]	150 [C, D]	69 [C, D]	36 [C, D]
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [D] *Criterion is applied as total inorganic arsenic (i.e. arsenic (III) + arsenic (V)).*						
5	BHC Gamma (Lindane)	58899	y	0.95	0.08 [A]	0.16 [A]	--
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

340-041-8033

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
6	Cadmium	7440439	n	*See* **E**	*See* **C, F**	40 [C]	8.8 [C]
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [E] *The freshwater criterion for this metal is expressed as "total recoverable" and is a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote E at bottom of Table 30.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*						
7	Chlordane	57749	y	2.4 [A]	0.0043 [A]	0.09 [A]	0.004 [A]
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
8	*Chloride*	16887006	n	860,000	230,000	--	--
9	*Chlorine*	7782505	n	19	11	13	7.5
10	*Chlorpyrifos*	2921882	n	0.083	0.041	0.011	0.0056
11	Chromium III	16065831	n	*See* **C, F**	*See* **C, F**	--	--
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*						
12	Chromium VI	18540299	n	16 [C]	11 [C]	1100 [C]	50 [C]
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*						
13	Copper	7440508	y	*See* **E**	*See* **E**	4.8 [C]	3.1 [C]
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [E] *The freshwater criterion for this metal is expressed as "total recoverable" and is a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote E at bottom of Table 30.*						
14	Cyanide	57125	y	22 [J]	5.2 [J]	1 [J]	1 [J]
	[J] *This criterion is expressed as µg free cyanide (CN)/L.*						
15	DDT 4,4'	50293	y	1.1 [A, G]	0.001 [A, G]	0.13 [A, G]	0.001 [A, G]

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

340-041-8033

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* [G] *This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).*						
16	*Demeton*	8065483	n	--	0.1	--	0.1
17	Dieldrin	60571	y	0.24	0.056	0.71 [A]	0.0019 [A]
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
18	Endosulfan	115297	n	0.22 [A, H]	0.056 [A, H]	0.034 [A, H]	0.0087 [A, H]
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.* [H] *This value is based on the criterion published in Ambient Water Quality Criteria for Endosulfan (EPA 440/5-80-046) and should be applied as the sum of alpha- and beta-endosulfan.*						
19	Endosulfan Alpha	959988	y	0.22 [A]	0.056 [A]	0.034 [A]	0.0087 [A]
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
20	Endosulfan Beta	33213659	y	0.22 [A]	0.056 [A]	0.034 [A]	0.0087 [A]
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
21	Endrin	72208	y	0.086	0.036	0.037 [A]	0.0023 [A]
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
22	*Guthion*	86500	n	--	0.01	--	0.01
23	Heptachlor	76448	y	0.52 [A]	0.0038 [A]	0.053 [A]	0.0036 [A]
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
24	Heptachlor Epoxide	1024573	y	0.52 [A]	0.0038 [A]	0.053 [A]	0.0036 [A]
	[A] *See expanded endnote A at bottom of Table 30 for alternate frequency and duration of this criterion.*						
25	*Iron (total)*	7439896	n	--	1000	--	--
26	Lead	7439921	n	*See* **C , F**	*See* **C , F**	210 [C]	8.1 [C]
	[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*						

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

340-041-8033

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
[F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
27	*Malathion*	121755	n	--	0.1	--	0.1
28	Mercury (total)	7439976	n	2.4	0.012	2.1	0.025
29	*Methoxychlor*	72435	y	--	0.03	--	0.03
30	*Mirex*	2385855	n	--	0.001	--	0.001
31	Nickel	7440020	y	*See* **C , F**	*See* **C , F**	74 [C]	8.2 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*							
32	*Parathion*	56382	n	0.065	0.013	--	--
33	Pentachlorophenol	87865	y	*See* **H**	*See* **H**	13	7.9
[H] *Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC=(exp(1.005(pH)-4.869); CCC=exp(1.005(pH)-5.134).*							
34	*Phosphorus Elemental*	7723140	n	--	--	--	0.1
35	Polychlorinated Biphenyls (PCBs)	NA	y	2 [K]	0.014 [K]	10 [K]	0.03 [K]
[K] *This criterion applies to total PCBs (e.g.* determined as Aroclors or congeners)							
36	Selenium	7782492	y	*See* **C , L**	4.6 [C]	290 [C]	71 [C]
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.* [L] *The CMC=(1/[(f1/CMC1)+(f2/CMC2)]µg/L) * CF where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively,and CMC1 and CMC2 are 185.9 µg/L and 12.82 µg/L, respectively. See expanded endnote F for the Conversion Factor (CF) for selenium.*							
37	Silver	7440224	n	*See* **C , F**	0.10 [C]	1.9 [C]	--
[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*							

Table 30

Aquatic Life Water Quality Criteria for Toxic Pollutants

340-041-8033

	Pollutant	CAS Number	Human Health Criterion	Freshwater (µg/L)		Saltwater (µg/L)	
				Acute Criterion (CMC)	Chronic Criterion (CCC)	Acute Criterion (CMC)	Chronic Criterion (CCC)
	[F] *The freshwater acute criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*						
38	*Sulfide Hydrogen Sulfide*	7783064	n	--	2	--	2
39	Toxaphene	8001352	y	0.73	0.0002	0.21	0.0002
40	*Tributyltin (TBT)*	688733	n	0.46	0.063	0.37	0.01
41	Zinc	7440666	y	*See* **C , F**	*See* **C , F**	90 [C]	81 [C]

[C] *Criterion is expressed in terms of "dissolved" concentrations in the water column.*

[F] *The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. To calculate the criterion, use formula under expanded endnote F at bottom of Table 30.*

Expanded Endnotes A, E, F

Endnote A: Alternate Frequency and Duration for Certain Pesticides

This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines which update minimum data requirements and derivation procedures. The CMC may not be exceeded at any time and the CCC may not be exceeded based on a 24-hour average. The CMC may be applied using a one hour averaging period not to be exceeded more than once every three years, if the CMC values given in Table 30 are divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Endnote E: Equations for Hardness-Dependent Freshwater Metals Criteria for Cadmium Acute and Copper Acute and Chronic Criteria

The freshwater criterion for this metal is expressed as total recoverable with two significant figures, and is a function of hardness (mg/L) in the water column. Criteria values for hardness

are calculated using the following formulas (CMC refers to the acute criterion; CCC refers to the chronic criterion):

$$\textbf{CMC} = (\exp(m_A*[\ln(\text{hardness})] + b_A))$$

$$\textbf{CCC} = (\exp(m_C*[\ln(\text{hardness})] + b_C))$$

Chemical	m_A	b_A	m_C	b_C
Cadmium	1.128	-3.828	N/A	N/A
Copper	0.9422	-1.464	0.8545	-1.465

Endnote F: Equations for Hardness-Dependent Freshwater Metals Criteria and Conversion Factor Table

The freshwater criterion for this metal is expressed as dissolved with two significant figures, and is a function of hardness (mg/L) in the water column. Criteria values for hardness are calculated using the following formulas (CMC refers to the acute criterion; CCC refers to the chronic criterion):

$$\textbf{CMC} = (\exp(m_A*[\ln(\text{hardness})] + b_A))*CF$$

$$\textbf{CCC} = (\exp(m_C*[\ln(\text{hardness})] + b_C))*CF$$

"CF" is the conversion factor used for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column.

Chemical	m_A	b_A	m_C	b_C
Cadmium	N/A	N/A	0.7409	-4.719
Chromium III	0.8190	3.7256	0.8190	0.6848
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.59	--	--
Zinc	0.8473	0.884	0.8473	0.884

The conversion factors (CF) below must be used in the equations above for the hardness-dependent metals in order to convert total recoverable metals criteria to dissolved metals criteria. For metals that are not hardness-dependent (i.e. arsenic, chromium VI, selenium, and silver (chronic)), or are saltwater criteria, the criterion value associated with the metal in Table 30 already reflects a dissolved criterion based on its conversion factor below.

Conversion Factor (CF) Table for Dissolved Metals

Chemical	Freshwater		Saltwater	
	Acute	Chronic	Acute	Chronic
Arsenic	1.000	1.000	1.000	1.000
Cadmium	N/A	1.101672-[(ln hardness)(0.041838)]	0.994	0.994
Chromium III	0.316	0.860	--	--
Chromium VI	0.982	0.962	0.993	0.993
Copper	N/A	N/A	0.83	0.83
Lead	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]	0.951	0.951
Nickel	0.998	0.997	0.990	0.990
Selenium	0.996	0.922	0.998	0.998
Silver	0.85	0.85	0.85	--
Zinc	0.978	0.986	0.946	0.946

~~Endnote M: Equations for Freshwater Ammonia Calculations~~

~~Acute Criterion~~

~~The 1-hour average concentration of un-ionized ammonia (mg/L NH_3) may not exceed more often than once every three years on average, the numerical value given by:~~

~~CMC_{NH3} = 0.52/FT/FPH/2 where:~~

~~*FT = temperature adjustment factor*~~
~~*FPH = pH adjustment factor*~~
~~*TCAP = temperature cap*~~

~~$FT = 10^{0.03(20-TCAP)}$; TCAP ≤ T ≤ 30° C~~

~~$FT = 10^{0.03(20-T)}$; $0 \le T \le TCAP$~~

~~$FPH = 1$ $8 \le pH \le 9$~~
~~$FPH = \frac{1}{1 + 10^{7.4-pH}}$ $6.5 \le pH \le 8$~~
~~1.25~~

~~TCAP = 20 ˚C; Salmonids and other sensitive coldwater species present~~
~~TCAP = 25 ˚C; Salmonids and other sensitive coldwater species absent~~

~~Chronic Criterion~~

~~The 4-day average concentration of un-ionized ammonia (mg/L NH_3) may not exceed more often than once every three years on average, the average numerical value given by:~~

~~$CCC_{NH3} = 0.80/FT/FPH/RATIO$~~

~~where FT and FPH are as above for acute criterion and:~~

~~$RATIO = 16$ *where* $7.7 \le pH \le 9$~~

~~$RATIO = 24 \times \left[\frac{10^{7.7-pH}}{1 + 10^{7.4-pH}}\right]$ *where* $6.5 \le pH \le 7.7$~~

~~TCAP = 15 ˚C; Salmonids and other sensitive coldwater species present~~
~~TCAP = 20 ˚C; Salmonids and other sensitive coldwater species absent~~

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AMMONIA FRESHWATER CRITERIA TABLES

Tables (a)-(c) based on EPA April 2013 document, *Aquatic Life Ambient Water Quality Criteria for Ammonia*-Freshwater 2013, Office of Water (EPA 822-R-13-001)

Table 30(a): Ammonia Acute Criteria Values (One-hour Average)—Salmonid Species Present Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

Criteria cannot be exceeded more than once every three years

$$Acute\ Criterion = MIN\left(\left(\frac{0.275}{1+10^{7.204-pH}}+\frac{39.0}{1+10^{pH-7.204}}\right),\left(0.7249\times\left(\frac{0.0114}{1+10^{7.204-pH}}+\frac{1.6181}{1+10^{pH-7.204}}\right)\times\left(23.12\times 10^{0.036\times(20-T)}\right)\right)\right)$$

	Temperature (°C)																
pH	**0-14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	33	33	32	29	27	25	23	21	19	18	16	15	14	13	12	11	9.9
6.6	31	31	30	28	26	24	22	20	18	17	16	14	13	12	11	10	9.5
6.7	30	30	29	27	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0
6.8	28	28	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5
6.9	26	26	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9
7.0	24	24	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	8.0	7.3
7.1	22	22	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7
7.2	20	20	19	18	16	15	14	13	12	11	9.8	9.1	8.3	7.7	7.1	6.5	6.0
7.3	18	18	17	16	14	13	12	11	10	9.5	8.7	8.0	7.4	6.8	6.3	5.8	5.3
7.4	15	15	15	14	13	12	11	9.8	9.0	8.3	7.7	7.0	6.5	6.0	5.5	5.1	4.7
7.5	13	13	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4.0
7.6	11	11	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	9.6	9.6	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	3.0
7.8	8.1	8.1	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.2	2.9	2.7	2.5
7.9	6.8	6.8	6.6	6.0	5.6	5.1	4.7	4.3	4.0	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8.0	5.6	5.6	5.4	5.0	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6	2.4	2.2	2.0	1.9	1.7
8.1	4.6	4.6	4.5	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4
8.2	3.8	3.8	3.7	3.5	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	3.1	3.1	3.1	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.96
8.4	2.6	2.6	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79
8.5	2.1	2.1	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.90	0.83	0.77	0.71	0.65
8.6	1.8	1.8	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.96	0.88	0.81	0.75	0.69	0.63	0.59	0.54
8.7	1.5	1.5	1.4	1.3	1.2	1.1	1.0	0.94	0.87	0.80	0.74	0.68	0.62	0.57	0.53	0.49	0.45
8.8	1.2	1.2	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1.0	1.0	1.0	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.40	0.37	0.34	0.32
9.0	0.88	0.88	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

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AMMONIA FRESHWATER CRITERIA TABLES

Tables (a)-(c) based on EPA April 2013 document, *Aquatic Life Ambient Water Quality Criteria for Ammonia*-Freshwater 2013, Office of Water (EPA 822-R-13-001)

Table 30(b): Ammonia Acute Criteria Values (One-hour Average*)—Salmonid Species Absent Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

Criteria cannot be exceeded more than once every three years

$$Acute\ Criterion = 0.7249 \times \frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}} \times MIN\left(51.93, 23.12 \times 10^{0.036\times(20-T)}\right)$$

	Temperature (°C)																				
pH	**0-10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	51	48	44	41	37	34	32	29	27	25	23	21	19	18	16	15	14	13	12	11	9.9
6.6	49	46	42	39	36	33	30	28	26	24	22	20	18	17	16	14	13	12	11	10	9.5
6.7	46	44	40	37	34	31	29	27	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0
6.8	44	41	38	35	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5
6.9	41	38	35	32	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9
7.0	38	35	33	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9	7.3
7.1	34	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7
7.2	31	29	27	25	23	21	19	18	16	15	14	13	12	11	9.8	9.1	8.3	7.7	7.1	6.5	6.0
7.3	27	26	24	22	20	18	17	16	14	13	12	11	10	9.5	8.7	8.0	7.4	6.8	6.3	5.8	5.3
7.4	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0	8.3	7.7	7.0	6.5	6.0	5.5	5.1	4.7
7.5	21	19	18	17	15	14	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4.0
7.6	18	17	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	2.9
7.8	13	12	11	10	9.3	8.5	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.2	2.9	2.7	2.5
7.9	11	9.9	9.1	8.4	7.7	7.1	6.6	3.0	5.6	5.1	4.7	4.3	4.0	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8.0	8.8	8.2	7.6	7.0	6.4	5.9	5.4	5.0	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6	2.4	2.2	2.0	1.9	1.7
8.1	7.2	6.8	6.3	5.8	5.3	4.9	4.5	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4
8.2	6.0	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	4.9	4.6	4.3	3.9	3.6	3.3	3.1	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.96
8.4	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79
8.5	3.3	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.90	0.83	0.77	0.71	0.65
8.6	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.96	0.88	0.81	0.75	0.69	0.63	0.58	0.54
8.7	2.3	2.2	2.0	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.94	0.87	0.80	0.74	0.68	0.62	0.57	0.53	0.49	0.45
8.8	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.40	0.37	0.34	0.32
9.0	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

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AMMONIA FRESHWATER CRITERIA TABLES

Tables (a)-(c) based on EPA April 2013 document, *Aquatic Life Ambient Water Quality Criteria for Ammonia*-Freshwater 2013, Office of Water (EPA 822-R-13-001)

Table 30(c): Ammonia Chronic Criteria Values (30-day Rolling Average*)

Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

* The highest four-day average within the 30-day averaging period must not be more than 2.5 times the chronic value

Criteria cannot be exceeded more than once every three years

$$Chronic\ Criterion = 0.8876 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times \left(2.126 \times 10^{0.028\times(20-MAX(T,7))}\right)$$

	Temperature (ºC)																							
pH	**0-7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	4.9	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.5	1.4	1.3	1.2	1.1
6.6	4.8	4.5	4.3	4.0	3.8	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1
6.7	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1
6.8	4.6	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1
6.9	4.5	4.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0
7.0	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	0.99
7.1	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95
7.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.96	0.90
7.3	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.97	0.91	0.85
7.4	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.96	0.90	0.85	0.79
7.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.83	0.78	0.73
7.6	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.1	0.98	0.92	0.86	0.81	0.76	0.71	0.67
7.7	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.60
7.8	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53
7.9	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.50	0.47
8.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.60	0.56	0.53	0.50	0.44	0.44	0.41
8.1	1.5	1.5	1.4	1.3	1.2	1.1	1.1	0.99	0.92	0.87	0.81	0.76	0.71	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35
8.2	1.3	1.2	1.2	1.1	1.0	0.96	0.90	0.84	0.79	0.74	0.70	0.65	0.61	0.57	0.54	0.50	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.30
8.3	1.1	1.1	0.99	0.93	0.87	0.82	0.76	0.72	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26
8.4	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.50	0.47	0.44	0.41	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.25	0.23	0.22
8.5	0.80	0.75	0.71	0.67	0.62	0.58	0.55	0.51	0.48	0.45	0.42	0.40	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.24	0.22	0.21	0.20	0.18
8.6	0.68	0.64	0.60	0.56	0.53	0.49	0.46	0.43	0.41	0.38	0.36	0.33	0.31	0.29	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.16	0.15
8.7	0.57	0.54	0.51	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13
8.8	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26	0.24	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.13	0.12	0.11
8.9	0.42	0.39	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.09
9.0	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.11	0.10	0.09	0.09	0.08

State of Oregon
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AMMONIA FRESHWATER CRITERIA TABLES

Tables (a)-(c) based on EPA April 2013 document, *Aquatic Life Ambient Water Quality Criteria for Ammonia*-Freshwater 2013, Office of Water (EPA 822-R-13-001)

TABLE 31: Aquatic Life Water Quality Guidance Values for Toxic Pollutants

Effective April 18, 2014

Water Quality Guidance Values Summary [A]

The concentration for each compound listed in Table 31 is a guidance value that DEQ may~~can be~~ use~~d~~ in application of Oregon's Toxic Substances Narrative (340-041-0033(2)) to waters of the state in order to protect aquatic life. All values are expressed as micrograms per liter (µg/L) except where noted. Compounds are listed in alphabetical order with the corresponding EPA number (from National Recommended Water Quality Criteria: 2002, EPA-822-R-02-047), corresponding Chemical Abstract Service (CAS) number, aquatic life freshwater acute and chronic guidance values, and aquatic life saltwater acute and chronic guidance values.

Table 31
Aquatic Life Water Quality Guidance Values for Toxic Pollutants
340-041-8033

EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
56	Acenaphthene	83329	1,700	520	970	710
17	Acrolein	107028	68	21	55	
18	Acrylonitrile	107131	7,550	2,600		
1	Antimony	7440360	9,000	1,600		
19	Benzene	71432	5,300		5,100	700
59	Benzidine	92875	2,500			
3	Beryllium	7440417	130	5.3		
19 B	BHC (Hexachlorocyclohexane-Technical)	319868	100		0.34	
21	Carbon Tetrachloride	56235	35,200		50,000	
	Chlorinated Benzenes		250	50	160	129
	Chlorinated naphthalenes		1,600		7.5	
	Chloroalkyl Ethers		238,000			
26	Chloroform	67663	28,900	1,240		
45	Chlorophenol 2-	95578	4,380	2,000		
	Chlorophenol 4-	106489			29,700	
52	Methyl-4-chlorophenol 3-	59507	30			

Table 31
Aquatic Life Water Quality Guidance Values for Toxic Pollutants
340-041-8033

EPA No.	Pollutant	CAS Number	Freshwater		Saltwater	
			Acute	Chronic	Acute	Chronic
5a	Chromium (III)	16065831			10,300	
109	DDE 4,4'-	72559	1,050		14	
110	DDD 4,4'-	72548	0.06		3.6	
	Diazinon	333415	0.08	0.05		
	Dichlorobenzenes		1,120	763	1,970	
29	Dichloroethane 1,2-	107062	118,000	20,000	113,000	
	Dichloroethylenes		11,600		224,000	
46	Dichlorophenol 2,4-	120832	2,020	365		
31	Dichloropropane 1,2-	78875	23,000	5,700	10,300	3,040
32	Dichloropropene 1,3-	542756	6,060	244	790	
47	Dimethylphenol 2,4-	105679	2,120			
	Dinitrotoluene		330	230	590	370
16	Dioxin (2,3,7,8-TCDD)	1746016	0.01	38 pg/L		
85	Diphenylhydrazine 1,2-	122667	270			
33	Ethylbenzene	100414	32,000		430	
86	Fluoranthene	206440	3,980		40	16
	Haloethers		360	122		
	Halomethanes		11,000		12,000	6,400
89	Hexachlorobutadiene	87683	90	9.3	32	
90	Hexachlorocyclopentadiene	77474	7	5.2	7	
91	Hexachloroethane	67721	980	540	940	
93	Isophorone	78591	117,000		12,900	
94	Naphthalene	91203	2,300	620	2,350	
95	Nitrobenzene	98953	27,000		6,680	
	Nitrophenols		230	150	4,850	
26 B	Nitrosamines	35576911	5,850		3,300,000	
	Pentachlorinated ethanes		7,240	1,100	390	281
54	Phenol	108952	10,200	2,560	5,800	
	Phthalate esters		940	3	2,944	3.4
	Polynuclear Aromatic Hydrocarbons				300	

Table 31 **Aquatic Life Water Quality Guidance Values for Toxic Pollutants** **340-041-8033**						
			Freshwater		**Saltwater**	
EPA No.	**Pollutant**	**CAS Number**	**Acute**	**Chronic**	**Acute**	**Chronic**
	Tetrachlorinated Ethanes		9,320			
37	Tetrachloroethane 1,1,2,2-	79345		2,400	9,020	
	Tetrachloroethanes		9,320			
38	Tetrachloroethylene	127184	5,280	840	10,200	450
	Tetrachlorophenol 2,3,5,6					440
12	Thallium	7440280	1,400	40	2,130	
39	Toluene	108883	17,500		6,300	5,000
	Trichlorinated ethanes		18,000			
41	Trichloroethane 1,1,1-	71556			31,200	
42	Trichloroethane 1,1,2-	79005		9,400		
43	Trichloroethylene	79016	45,000	21,900	2,000	
55	Trichlorophenol 2,4,6-	88062		970		

The following chemicals/compounds/classes are of concern due to the potential for toxic effects to aquatic organisms; however, no guidance values are designated. If these compounds are identified in the waste stream, then a review of the scientific literature may be appropriate for deriving guidance values.

- Polybrominated diphenyl ethers (PBDE)
- Polybrominated biphenyls (PBB)
- Pharmaceuticals
- Personal care products
- Alkyl Phenols
- Other chemicals with Toxic effects

Footnotes:

A Values in Table 31 are applicable to all basins.

B This number was assigned to the list of non-priority pollutants in National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047).

TABLE 40: Human Health Water Quality Criteria for Toxic Pollutants

Effective April 18, 2014

Human Health Criteria Summary

The concentration for each pollutant listed in Table 40 was derived to protect Oregonians from potential adverse health impacts associated with long-term exposure to toxic substances associated with consumption of fish, shellfish, and water. The "organism only" criteria are established to protect fish and shellfish consumption and apply to waters of the state designated for fishing. The "water + organism" criteria are established to protect the consumption of drinking water, fish, and shellfish, and apply where both fishing and domestic water supply (public and private) are designated uses. All criteria are expressed as micrograms per liter (µg/L), unless otherwise noted. Pollutants are listed in alphabetical order. Additional information includes the Chemical Abstract Service (CAS) number, whether the criterion is based on carcinogenic effects (can cause cancer in humans), and whether there is an aquatic life criterion for the pollutant (i.e. "y"= yes, "n" = no). All the human health criteria were calculated using a fish consumption rate of 175 grams per day unless otherwise noted. A fish consumption rate of 175 grams per day is approximately equal to 23 8-ounce fish meals per month. For pollutants categorized as carcinogens, values represent a cancer risk of one additional case of cancer in one million people (i.e. 10^{-6}), unless otherwise noted. All metals criteria are for total metal concentration, unless otherwise noted. Italicized pollutants represent non-priority pollutants. The human health criteria revisions established by OAR 340-041-0033 and shown in Table 40 do not become applicable for purposes of ORS chapter 468B or the federal Clean Water Act until approved by EPA pursuant to 40 CFR 131.21 (4/27/2000).

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

340-041-8033

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
1	Acenaphthene	83329	n	n	95	99
2	Acrolein	107028	n	n	0.88	0.93
3	Acrylonitrile	107131	y	n	0.018	0.025
4	Aldrin	309002	y	y	0.0000050	0.0000050
5	Anthracene	120127	n	n	2900	4000

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

340-041-8033

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
6	Antimony	7440360	n	n	5.1	64
7	Arsenic (inorganic) [A]	7440382	y	y	2.1	2.1(freshwater) 1.0 (saltwater)
	[A] *The arsenic criteria are expressed as total inorganic arsenic. The "organism only" freshwater criterion is based on a risk level of approximately 1 x 10^{-5}, and the "water + organism" criterion is based on a risk level of 1 x 10^{-4}.*					
8	Asbestos [B]	1332214	y	n	7,000,000 fibers/L	--
	[B] *The human health risks from asbestos are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
9	*Barium* [C]	7440393	n	n	1000	--
	[C] *The human health criterion for barium is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
10	Benzene	71432	y	n	0.44	1.4
11	Benzidine	92875	y	n	0.000018	0.000020
12	Benz(a)anthracene	56553	y	n	0.0013	0.0018
13	Benzo(a)pyrene	50328	y	n	0.0013	0.0018
14	Benzo(b)fluoranthene 3,4	205992	y	n	0.0013	0.0018
15	Benzo(k)fluoranthene	207089	y	n	0.0013	0.0018
16	BHC Alpha	319846	y	n	0.00045	0.00049
17	BHC Beta	319857	y	n	0.0016	0.0017
18	BHC Gamma (Lindane)	58899	n	y	0.17	0.18
19	Bromoform	75252	y	n	3.3	14
20	Butylbenzyl Phthalate	85687	n	n	190	190
21	Carbon Tetrachloride	56235	y	n	0.10	0.16
22	Chlordane	57749	y	y	0.000081	0.000081
23	Chlorobenzene	108907	n	n	74	160
24	Chlorodibromomethane	124481	y	n	0.31	1.3
25	Chloroethyl Ether bis 2	111444	y	n	0.020	0.053
26	Chloroform	67663	n	n	260	1100
27	Chloroisopropyl Ether bis 2	108601	n	n	1200	6500
28	*Chloromethyl ether, bis*	542881	y	n	0.000024	0.000029

State of Oregon Department of Environmental Quality

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

340-041-8033

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
29	Chloronaphthalene 2	91587	n	n	150	160
30	Chlorophenol 2	95578	n	n	14	15
31	*Chlorophenoxy Herbicide (2,4,5,-TP)* [D]	93721	n	n	10	--
	[D] *The Chlorophenoxy Herbicide (2,4,5,-TP) criterion is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
32	*Chlorophenoxy Herbicide (2,4-D)* [E]	94757	n	n	100	--
	[E] *The Chlorophenoxy Herbicide (2,4-D) criterion is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
33	Chrysene	218019	y	n	0.0013	0.0018
34	Copper [F]	7440508	n	y	1300	--
	[F] *Human health risks from copper are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
35	Cyanide [G]	57125	n	y	130	130
	[G] *The cyanide criterion is expressed as total cyanide (CN)/L.*					
36	DDD 4,4'	72548	y	n	0.000031	0.000031
37	DDE 4,4'	72559	y	n	0.000022	0.000022
38	DDT 4,4'	50293	y	y	0.000022	0.000022
39	Dibenz(a,h)anthracene	53703	y	n	0.0013	0.0018
40	Dichlorobenzene(m) 1,3	541731	n	n	80	96
41	Dichlorobenzene(o) 1,2	95501	n	n	110	130
42	Dichlorobenzene(p) 1,4	106467	n	n	16	19
43	Dichlorobenzidine 3,3'	91941	y	n	0.0027	0.0028
44	Dichlorobromomethane	75274	y	n	0.42	1.7
45	Dichloroethane 1,2	107062	y	n	0.35	3.7
46	Dichloroethylene 1,1	75354	n	n	230	710
47	Dichloroethylene trans 1,2	156605	n	n	120	1000

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

340-041-8033

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
48	Dichlorophenol 2,4	120832	n	n	23	29
49	Dichloropropane 1,2	78875	y	n	0.38	1.5
50	Dichloropropene 1,3	542756	y	n	0.30	2.1
51	Dieldrin	60571	y	y	0.0000053	0.0000054
52	Diethyl Phthalate	84662	n	n	3800	4400
53	Dimethyl Phthalate	131113	n	n	84000	110000
54	Dimethylphenol 2,4	105679	n	n	76	85
55	Di-n-butyl Phthalate	84742	n	n	400	450
56	Dinitrophenol 2,4	51285	n	n	62	530
57	*Dinitrophenols*	25550587	n	n	62	530
58	Dinitrotoluene 2,4	121142	y	n	0.084	0.34
59	Dioxin (2,3,7,8-TCDD)	1746016	y	n	0.00000000051	0.00000000051
60	Diphenylhydrazine 1,2	122667	y	n	0.014	0.020
61	Endosulfan Alpha	959988	n	y	8.5	8.9
62	Endosulfan Beta	33213659	n	y	8.5	8.9
63	Endosulfan Sulfate	1031078	n	n	8.5	8.9
64	Endrin	72208	n	y	0.024	0.024
65	Endrin Aldehyde	7421934	n	n	0.030	0.030
66	Ethylbenzene	100414	n	n	160	210
67	Ethylhexyl Phthalate bis 2	117817	y	n	0.20	0.22
68	Fluoranthene	206440	n	n	14	14
69	Fluorene	86737	n	n	390	530
70	Heptachlor	76448	y	y	0.0000079	0.0000079
71	Heptachlor Epoxide	1024573	y	y	0.0000039	0.0000039
72	Hexachlorobenzene	118741	y	n	0.000029	0.000029
73	Hexachlorobutadiene	87683	y	n	0.36	1.8
74	*Hexachlorocyclo-hexane-Technical*	608731	y	n	0.0014	0.0015
75	Hexachlorocyclopentadiene	77474	n	n	30	110
76	Hexachloroethane	67721	y	n	0.29	0.33
77	Indeno(1,2,3-cd)pyrene	193395	y	n	0.0013	0.0018
78	Isophorone	78591	y	n	27	96

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

340-041-8033

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	Human Health Criteria for the Consumption of:	
					Water + Organism (µg/L)	Organism Only (µg/L)
79	*Manganese* [H]	7439965	n	n	--	100
	[H] *The "fish consumption only" criterion for manganese applies only to salt water and is for total manganese. This EPA recommended criterion predates the 1980 human health methodology and does not utilize the fish ingestion BCF calculation method or a fish consumption rate.*					
80	*Methoxychlor* [I]	72435	n	y	100	--
	[I] *The human health criterion for methoxychlor is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
81	Methyl Bromide	74839	n	n	37	150
82	Methyl-4,6-dinitrophenol 2	534521	n	n	9.2	28
83	Methylene Chloride	75092	y	n	4.3	59
84	Methylmercury (mg/kg) [J]	22967926	n	n	--	0.040 mg/kg
	[J] *This value is expressed as the fish tissue concentration of methylmercury. Contaminated fish and shellfish is the primary human route of exposure to methylmercury.*					
85	Nickel	7440020	n	y	140	170
86	*Nitrates* [K]	14797558	n	n	10000	--
	[K] *The human health criterion for nitrates is the same as originally published in the 1976 EPA Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value was also published in the 1986 EPA Gold Book. Human health risks are primarily from drinking water, therefore no "organism only" criterion was developed. The "water + organism" criterion is based on the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act.*					
87	Nitrobenzene	98953	n	n	14	69
88	*Nitrosamines*	35576911	y	n	0.00079	0.046
89	*Nitrosodibutylamine, N*	924163	y	n	0.0050	0.022
90	*Nitrosodiethylamine, N*	55185	y	n	0.00079	0.046
91	Nitrosodimethylamine, N	62759	y	n	0.00068	0.30
92	Nitrosodi-n-propylamine, N	621647	y	n	0.0046	0.051
93	Nitrosodiphenylamine, N	86306	y	n	0.55	0.60
94	*Nitrosopyrrolidine, N*	930552	y	n	0.016	3.4
95	*Pentachlorobenzene*	608935	n	n	0.15	0.15
96	Pentachlorophenol	87865	y	y	0.15	0.30
97	Phenol	108952	n	n	9400	86000
98	Polychlorinated Biphenyls (PCBs) [L]	NA	y	y	0.0000064	0.0000064

Table 40

Human Health Water Quality Criteria for Toxic Pollutants

340-041-8033

No.	Pollutant	CAS Number	Carcinogen	Aquatic Life Criterion	*Human Health Criteria for the Consumption of:*	
					Water + Organism (µg/L)	Organism Only (µg/L)
	[L] *This criterion applies to total PCBs (e.g. determined as Aroclors or congeners).*					
99	Pyrene	129000	n	n	290	400
100	Selenium	7782492	n	y	120	420
101	*Tetrachlorobenzene, 1,2,4,5-*	95943	n	n	0.11	0.11
102	Tetrachloroethane 1,1,2,2	79345	y	n	0.12	0.40
103	Tetrachloroethylene	127184	y	n	0.24	0.33
104	Thallium	7440280	n	n	0.043	0.047
105	Toluene	108883	n	n	720	1500
106	Toxaphene	8001352	y	y	0.000028	0.000028
107	Trichlorobenzene 1,2,4	120821	n	n	6.4	7.0
108	Trichloroethane 1,1,2	79005	y	n	0.44	1.6
109	Trichloroethylene	79016	y	n	1.4	3.0
110	Trichlorophenol 2,4,6	88062	y	n	0.23	0.24
111	*Trichlorophenol, 2, 4, 5-*	95954	n	n	330	360
112	Vinyl Chloride	75014	y	n	0.023	0.24
113	Zinc	7440666	n	y	2100	2600

State of Oregon
Department of
Environmental
Quality

TECHNICAL SUPPORT DOCUMENT FOR AMMONIA

Water Quality Standards Revisions for Freshwater Ammonia Criteria

April 2014 – January 2015

Andrea Matzke
Water Quality Standards Specialist
Environmental Solutions, WQ Standards & Assessment

ABOUT THIS DOCUMENT

This document supports revisions to Oregon's freshwater criteria for ammonia. Associated rulemaking documents are on DEQ's Rules and Regulations Web page at http://www.oregon.gov/deq/RulesandRegulations/Pages/default.aspx.

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LAST UPDATE | DECEMBER 1, 2014

Contents

I. INTRODUCTION

Water quality standards regulations define the water quality goals for a waterbody. These goals designate the use or uses, set criteria necessary to protect the uses, and prevent or limit degradation through antidegradation provisions. In January 2013, the Environmental Protection Agency (EPA) disapproved Oregon's revised freshwater ammonia criteria that DEQ submitted for approval in 2004. To address this disapproval, DEQ proposes adopting EPA's latest criteria recommendations that take into account mussel and snail sensitivity to ammonia. The Environmental Quality Commission (EQC) must adopt and EPA must approve the ammonia criteria revisions before the rule amendments become effective for Clean Water Act purposes.

I.A. Scope of Rulemaking

The proposed rules revise Oregon's freshwater ammonia criteria, aligning the criteria with EPA's latest recommendations finalized in August 2013. EPA's recommendations consider unionid mussels' and non-pulmonate snails' sensitivity to ammonia. Including mollusks in the national dataset makes the ammonia criteria more stringent than if mollusks were not included. There is flexibility to derive site-specific criteria for ammonia in waterbodies where mussels are not present. However, the proposed rules do not include site-specific criteria for waters without mussels or snails because available information indicates that the current and historical presence of mussels and snails throughout Oregon is expansive (see Appendix B).

The proposed rules would also make minor water quality standards rule corrections and clarifications to:

- Correct an error in the basin-specific pH standard for the main stem Snake River.
- Add notes indicating EPA disapproval of the narrative natural conditions criterion under OAR 340-041-0007(2) and the natural conditions criterion for temperature under OAR-340-041-0028(8).
- Amend the Umatilla Basin-specific standards and uses to incorporate EPA's partial disapproval of DEQ's site-specific criteria and use designations for the West Division Main Canal.

See additional information about these corrections in the Public Notice document accompanying this rulemaking: http://www.oregon.gov/deq/RulesandRegulations/Pages/default.aspx

II. BACKGROUND

II.A. National Marine Fisheries Service Jeopardy Decision

When the EQC adopts water quality standards, DEQ must submit the criteria to EPA for approval. Section 7(a)(2) of the Endangered Species Act requires federal agencies, including EPA, to consult with the U.S. Fish and Wildlife Service and National Marine Fisheries Service, as appropriate, to

ensure that its actions, such as approval of DEQ water quality standards, are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats.

NMFS jurisdiction includes protecting ocean species such as salmon and steelhead and mammals, such as killer whales and seals. ESA action areas for NMFS's consultation included the freshwater, estuarine and ocean areas under the State of Oregon's jurisdiction where the criteria apply and areas beyond the state's jurisdiction where the regulated pollutants could be transported.

The NMFS Biological Opinion[1] dated Aug. 14, 2012 contained an analysis of criteria that Oregon adopted in 2004 for 20 toxic pollutants[2] associated with 39 freshwater criteria and 26 saltwater criteria, including ammonia criteria. The ammonia criteria that DEQ adopted in 2004 were based on the latest EPA recommendations from 1999.

NMFS concluded that the following Oregon criteria would cause "jeopardy" to many Oregon anadromous salmon and trout species[3], in addition to Southern Resident killer whales (based on a long-term, permanent reduction in primary prey—Chinook salmon): (1) ammonia: acute and chronic; (2) copper: acute and chronic; (3) cadmium: acute; and (4) aluminum[4]: acute and chronic. "Jeopardy" means that NMFS found that Oregon's aquatic life toxics criteria would likely jeopardize the continued existence of threatened and endangered species in Oregon or likely to destroy or adversely modify designated critical habitat. DEQ will address NMFS's jeopardy decisions associated with EPA disapproval for copper, cadmium and aluminum in future rulemakings.

NMFS recommended that EPA disapprove Oregon's acute and chronic ammonia criteria that Oregon submitted for approval based on the 1999 EPA recommendations. NMFS's Reasonable and Prudent Alternatives in its Biological Opinion indicated that EPA should retain Oregon's currently effective

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[1] National Marine Fisheries Service. Jeopardy and Destruction or Adverse Modification of Critical Habitat Endangered Species Act Biological Opinion for Environmental Protection Agency's Proposed Approval of Certain Oregon Administrative Rules Related to Revised Water Quality Criteria for Toxic Pollutants. NMFS Consultation Number: 2008/00148. August 14, 2012. The long delay was due in part to technical challenges and litigation.

[2] Aluminum, Ammonia, Arsenic , gamma-BHC (Lindane), Cadmium, Chromium (III), Chromium (VI), Copper, Dieldrin, alpha- Endosulfan, beta- Endosulfan, Endrin, Heptachlor epoxide, Lead, Nickel, Pentachlorophenol, Selenium, Silver, Tributyltin, and Zinc.

[3] LCR Chinook salmon, UWR Chinook salmon, UCR spring-run Chinook salmon, SR spring/summer-run Chinook salmon, SR fall-run Chinook salmon, CR chum salmon, LCR coho salmon, SONCC coho salmon, OC coho salmon, SR sockeye salmon, LCR steelhead, UWR steelhead, MCR steelhead, UCR steelhead, SRB steelhead, green sturgeon, eulachon (anadromous smelt), Southern Resident killer whales

[4] Note that EPA withdrew their request for NMFS consultation on Oregon's acute and chronic aluminum criteria when EPA realized that Oregon's submitted aluminum criteria included a footnote that indicated the criteria are meant to apply to waters with pH less than 6.6 and hardness less than 12 mg/L (as CaCO3). This footnote differs from EPA national recommendations. The court-ordered Aug. 14, 2012 deadline for the biological opinion did not allow NMFS time to withdraw the acute and chronic aluminum criteria from its opinion. EPA ultimately disapproved Oregon's aluminum criteria in their January 2013 action letter.

chronic criteria based on 1985 EPA recommendations and to use the "specific process"[5] described below, along with other considerations, to derive acute criteria for ammonia.

Process for Deriving Criteria

1) "Only use toxicity data for ammonia, cadmium, and aluminum that is specific to salmonid fishes (if new information becomes available for these compounds for green sturgeon and eulachon, then EPA shall include this data in its analysis);

2) All toxicity data used to derive the numeric criteria must be curve-fitted, where the literature provides the necessary data to perform this step;

3) When available, the curve-fitted toxicity data must be used to extrapolate threshold acute and chronic toxic effect concentrations;

4) Derived criteria must be model-adjusted to account for chemical mixtures; and,

5) An appropriate population model must be applied to the derived criteria, and must predict no negative change in the intrinsic population growth rate (*e.g.*, lambda, λ)."

The NMFS opinion further states that EPA will ensure the new revised criteria will be effective within 24 months after EPA's final action to approve or disapprove Oregon's proposed water quality criteria under the Clean Water Act.

EPA and NMFS are currently discussing how the EPA latest August 2013 ammonia recommendations follow the specific process above.

The U.S. Fish and Wildlife Service, in their July 30, 2012 Biological Opinion, did not find jeopardy with Oregon's toxics criteria, including ammonia. The USFWS's jurisdiction includes protecting threatened and endangered freshwater aquatic species such as mollusks, Bull Trout, Oregon Chub, Lost River and Shortnose Suckers.

[5] National Marine Fisheries Service. Jeopardy and Destruction or Adverse Modification of Critical Habitat Endangered Species Act Biological Opinion for Environmental Protection Agency's Proposed Approval of Certain Oregon Administrative Rules Related to Revised Water Quality Criteria for Toxic Pollutants. NMFS Consultation Number: 2008/00148. August 14, 2012. Page 550.

II.B. EPA Disapproval Action

On Jan. 31, 2013, following NMFS's Biological Opinion, EPA took action[6] on Oregon's new or revised aquatic life toxics criteria submitted in 2004. Among other disapprovals for aquatic life criteria, EPA disapproved the acute and chronic freshwater criteria for ammonia because new toxicity data showed that the criteria were not protective of mollusks.

Oregon adopted EPA's 1999 national criteria recommendations for ammonia in 2004. At that time, the 1999 recommendations were based on the latest science—toxicity to salmonids and bluegill sunfish. However, new toxicity data based on mollusks became available and formed the basis of EPA's 2009 proposed national recommendations. EPA based the proposed criteria on the presence or absence of mollusks.[7] These criteria were more stringent than the 1999 recommendations. Since the publication of the 2009 draft criteria, additional toxicity data on the effect of ammonia to gill-bearing (non-pulmonate) snails further validated toxicity to sensitive snails and mussels in the Unionidae family. In August 2013[8], EPA finalized its freshwater ammonia recommendations based on gill-bearing snails and unionid mussel sensitivity. These criteria supersede EPA's 1999 and 2009 recommendations.

EPA acted on Oregon's ammonia criteria prior to publishing the new 2013 recommendations; therefore, EPA specified the following remedies as options to address its disapproval of Oregon's ammonia criteria in its determination to DEQ:

> "1. Revise the adopted ammonia criteria to be consistent with the 2009 draft revised national recommendations for ammonia criteria.
>
> 2. Revise the ammonia criteria to ensure protection of Oregon's designated aquatic life uses. Also supply a sound scientific rationale to explain why the alternative ammonia criteria are protective of Oregon's designated aquatic life uses, taking into account any data on freshwater mussels and snails. Finally, to the extent that the adopted chronic aquatic life criterion for ammonia is less stringent than that specified by the National Marine Fisheries Services ("NMFS") to avoid jeopardy to listed species (i.e., less stringent than the value specified as a "Reasonable and Prudent Alternative" in the NMFS's August 14, 2012 biological opinion), provide additional sound scientific rationale to establish that the alternative chronic aquatic life criterion for ammonia is

[6] Environmental Protection Agency, Region 10. EPA Clean Water Act 303(c) Determinations On Oregon's New and Revised Aquatic Life Toxic Criteria Submitted on July 8, 2004, and as Amended by Oregon's April 23, 2007 and July 21, 2011 Submissions. January 30, 2013.

[7] The U.S. Fish and Wildlife Serve objected to the mussel presence/absence proposal, urging EPA in 2010 comments to drop the bifurcated approach in favor of a single national standard. Also, the Natural Resource Defense Council expressed concerns about the bifurcated standard's effect on mussel species listed under the ESA and urged EPA to strengthen its criteria to protect both listed species and species in danger of becoming endangered in the future.

[8] Environmental Protection Agency. Final Aquatic Life Ambient Water Quality Criteria For Ammonia—Freshwater 2013. Federal Register Vol. 78, No. 163 Thursday, August 22, 2013.

protective of Oregon's designated aquatic life uses, given NMFS's opinion of the effect of ammonia on Oregon's listed species."

DEQ proposes rules to revise criteria that most closely align with remedy 2 above and to base the criteria on the most recent scientific information on ammonia toxicity in the 2013 EPA recommendations. Although states have the discretion to adopt criteria different from EPA's national recommendations, DEQ does not believe there is a benefit in conducting additional toxicity studies or re-evaluating the toxicity studies supporting the updated EPA criteria to derive alternate criteria. As stated earlier, EPA and NMFS are evaluating how EPA's latest 2013 recommendations are consistent with the "specific process" (see section II.A) described in the Reasonable and Prudent Alternatives in NMFS's jeopardy opinion. If NMFS determines that EPA's criteria derivation method generally followed the Reasonable and Prudent Alternatives, then NMFS can conclude that EPA's 2013 ammonia criteria protect threatened and endangered species in Oregon, thus satisfying ESA consultation requirements. A "no jeopardy" decision from NMFS would likely lead to EPA approval of Oregon's proposed ammonia criteria.

II.C. Stakeholder Discussions

Prior to initiating rulemaking, DEQ sent an invitation to Oregon tribes and to a wide range of stakeholders to discuss and provide input to DEQ on rulemaking priorities to address EPA disapproved criteria for aluminum, ammonia, cadmium (acute) and copper. DEQ staff and stakeholders (Table 1) met in January and February of 2014. During these meetings, DEQ also shared information about EPA's updated criteria for freshwater copper and ammonia.

Table 1: Stakeholder List

Stakeholder Group	Date
1. DEQ water quality staff webinar	Jan. 23, 2014
2. Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians	Jan. 30, 2014
3. Cow Creek Band of Umpqua Tribe of Indians	Jan. 30, 2014
4. Pesticide Management Team (select members)	Jan. 30, 2014
5. Industrial Stormwater Dischargers	Jan. 31, 2014
6. Conservation/Fisheries Groups	Feb. 5, 2014
7. Association of Clean Water Agencies	Feb. 18, 2014
8. Associated Oregon Industries	Feb. 21, 2014
9. EPA	Feb. 28, 2014

Generally, staff and stakeholders support adopting the new EPA ammonia criteria recommendations as quickly as possible. Dischargers indicated that having up-to-date approvable criteria would resolve uncertainty about which ammonia criteria Oregon and EPA would ultimately recommend. These uncertainties have existed since 2004, particularly in issuing NPDES permits.

EPA supports Oregon's revisions to its ammonia criteria as soon as possible. On May 16, 2014, EPA Region 10 sent correspondence to Wendy Wiles, Administrator, Environmental Solutions Division. The correspondence urges Oregon to evaluate EPA's latest 2013 ammonia recommendations as part of DEQ's next triennial review. See Appendix A.

III. TECHNICAL BASIS FOR UPDATING FRESHWATER AMMONIA CRITERIA

III.A. General Overview of EPA 2013 Recommendations

This section summarizes information from EPA's 2013 ammonia recommendations:

- *Final Aquatic Life Ambient Water Quality Criteria For Ammonia—Freshwater 2013* in the Federal Register[9] dated Aug. 22, 2013.
- *Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013*[10]*.* This publication, hereafter called "EPA 2013 Criteria Document," provides detailed information about the derivation of the revised criteria.

The two documents above and other implementation documents are on EPA's website at http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/index.cfm.

EPA's methodology for assessing toxicity data in deriving updated ammonia criteria followed EPA's "*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*" (Stephan et al. 1985.) This is EPA's current guideline for deriving aquatic life toxics criteria.

The updated ammonia criteria, expressed as Total Ammonia Nitrogen, include ammonium (NH_4) and unionized ammonia (NH_3). Starting with its 1999 recommendation, EPA recommended a TAN expression of the ammonia criteria. EPA's 2013 Criteria Document states that because permit limits and compliance are usually expressed in terms of TAN given the toxicity of both forms of ammonia, expressing the criterion in terms of TAN eliminates the need to convert to and from unionized ammonia.

Both pH and temperature affect the toxicity of ammonia. Generally, as pH and temperature increase, the amount of unionized ammonia, the more toxic form of ammonia, predominates. Therefore, the criteria are more stringent as pH and temperature rise. Oregon expresses its current ammonia

[9] Environmental Protection Agency. Final Aquatic Life Ambient Water Quality Criteria For Ammonia—Freshwater 2013. Federal Register Vol. 78, No. 163 Thursday, August 22, 2013.

[10] Environmental Protection Agency. Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013. Office of Water. EPA-822-R-13-001. April 2013.

criteria, based on EPA's 1985 recommendations, as unionized ammonia. This requires specific calculations to adjust for temperature and pH, and then converting to TAN.

EPA bases the updated ammonia criteria on additional data showing the toxicity of ammonia to freshwater mussels in the family Unionidae and to gill-bearing (non-pulmonate) snails. Because unionid mussels and gill-bearing snails are in many freshwater systems throughout the United States, EPA recommended applying the acute and chronic criteria based on the assumption that these sensitive species are present in waterbodies throughout the country. This is in contrast to the 2009 draft recommendations that proposed a bifurcated approach—separate criteria based on mussels present or absent. DEQ may develop site-specific criteria based on the absence of mussels if a defensible mussel survey indicates mussels are not present. For more information about site-specific criteria, see Section IV. EPA removed six invasive/non-native species, such as Asiatic clams, from the national dataset based on comments received in response to the draft 2009 ammonia recommendations. Therefore, the proposed criteria protect species native to the United States.

EPA also renormalized the data based on a pH of 7 and a temperature of 20˚C to be more representative of freshwater systems. EPA does not recommend extrapolating criteria values outside the pH ranges shown in the ammonia criteria tables in Appendix D (i.e. 6.5 – 9.0) which represent the normal range of freshwaters.

EPA's acute criteria also consider presence or absence of salmonids. The presence of early life stages of fish in applying the chronic criteria is not applicable because the chronic dataset shows that mussels are more sensitive than any other early life fish species tested. Table 2 below contains summary information on how EPA applies the criteria, as well as the associated table reference for where the criteria and associated formulas are found in Appendix D.

Table 2: Criteria Application Summary

Criterion	Fish Presence?	Duration	Frequency	Table (App. D)
Acute	salmonids present	1-hour	not to be exceeded more than once every 3 years	30(a)
Acute	salmonids absent	1-hour	not to be exceeded more than once every 3 years	30(b)
Chronic	salmonids presence/absence or early life stages of fish not applicable	30-day rolling average*	not to be exceeded more than once every 3 years	30(c)

*Highest 4-day average within the 30-day averaging period must not be more than 2.5 times the chronic value

III.B. Effects to Freshwater Aquatic Life

Ammonia is a naturally occurring pollutant commonly found in waste products and fertilizers. Its presence can cause toxicity to aquatic life. Specific sources include:

- Municipal and industrial waste
- Septic system seepage
- Fertilizer runoff from agricultural and urban sources
- Manure application
- Concentrated animal feeding operations
- Aquaculture
- Landfill leachate

EPA conducted literature reviews from 1985 through October 2012 on the effects of ammonia to aquatic life. This search resulted in a large dataset that met EPA's 1985 Guidelines minimum data requirements for all eight taxa for both acute and chronic datasets. For the acute dataset, the four most sensitive species to ammonia are mussels in the Unionidae family. There are also several mussel species among the four most sensitive species in the chronic dataset. Table 3 below is reproduced from EPA's 2013 Criteria Document and describes the effects of ammonia on fish, invertebrates and bivalves.

Table 3: Effects of Ammonia on Fish and Invertebrates

Fish	Invertebrates and Bivalves
Proliferation in gill tissues, increased ventilation rates and damage to the gill epithelium	Reduced opening of valves for respiration and feeding
Reduction in blood oxygen-carrying capacity due to progressive acidosis	Impaired secretion of the byssus, or anchoring threads in bivalves
Uncoupling oxidative phosphorylation causing inhibition of production and depletion of ATP in the brain	Reduced ciliary action in bivalves
Disruption of osmoregulatory and circulatory activity disrupting normal metabolic functioning of the liver and kidneys	Depletion of lipid and carbohydrate stores leading to metabolic alteration, as well as mortality

The ammonia assessment was EPA's first explicit analysis of ESA-listed species in a criteria document. The national dataset includes fourteen threatened and endangered species including five mussels. EPA's analysis did not identify any of the listed species as the most sensitive species. However, the inclusion of listed species in deriving nationally recommended criteria does not remove ESA

consultation requirements when a state submits its revised water quality standards to EPA for approval.

III.C. Mussel and Snail Presence in Oregon

Mussels and snails are important to food webs, water quality, nutrient cycling and habitat quality in freshwater systems. According to *Freshwater Mussels of the Pacific Northwest,*[11] freshwater mussels are one of the most endangered groups of animals on Earth. Of the nearly 300 North American species, 35 have gone extinct in the last 100 years. ESA also lists nearly 25 percent as endangered or threatened and individual states list 75 percent as endangered, threatened or of special concern. The western part of the U.S. has a very low diversity compared to the 290 species that occur in the eastern two-thirds of North America.

Xerces Society data[12] indicates there are six species of mussels in Oregon and DEQ data sources indicate there are approximately 16 species or taxa of snails in Oregon. Table 4 below lists these species. Currently, ESA does not list any of these species as threatened or endangered.

Table 4: Mussel and snail species present in Oregon

Mussels	Snails
1. *Anodonta kennerlyi* (Western Floater)	1. Juga
2. *Anodonta oregonensis* (Oregon Floater)	2. *Juga hemphilli* (Indian Ford Juga)
3. *Anodonta californiensis* (California Floater)	3. *Juga bulbosa* (bulb juga)
4. *Anodonta nuttalliana* (Winged Floater)	4. *Juga plicifera* (pleated juga)
5. *Gonidea angulata* (Western ridged)	5. *Juga silicula* (Shasta juga)
6. *Margaritifera falcata* (Western pearlshell)	6. Fluminicola (pebblesnail)
	7. Hydrobiidae (mud snail)
	8. Melanoides
	9. Pleuroceridae
	10. *Potamopyrgus antipodarum* (New Zealand mud snail)
	11. Pristinicola
	12. *Pristinicola hemphilli* (pristine springsnail)
	13. Pyrgulopsis (springsnails)
	14. Valvata
	15. *Valvata humeralis* (glossy Valvata)
	16. Valvatidae

[11] Ethan Jay Nedeau, Allan K. Smith, Jen Stone, and Sarina Jepsen. *Freshwater Mussels of the Pacific Northwest, Second Edition*. The Xerces Society for Invertebrate Conservation. 2009.

[12] Xerces Society website: http://www.xerces.org/mollusks/. Accessed on June 9, 2014.

Although EPA used mussel toxicity data from specific species in the Unionidae family, the intent of the 2013 ammonia criteria is to protect the aquatic community as a whole even if mussels from the Unionidae family are absent, but other non-Unionidae mussels are present at a site. The Unionid species serve as surrogates for freshwater mussels in general and are not just representative of the family Unionidae. For example, all the mussels listed above with the exception of *Margaritifera falcata* are in the Unionidae family. *Margaritifera falcata* is in the Margaritiferidae family. If there are Oregon locations where there are species from the Margaritiferidae family and not the Unionidae family, the criteria dataset would still need to retain the toxicity data for the Unionidae mussels to protect all freshwater mussels.[13]

Maps in Appendix B show where mussels and snails occur or where historical information has documented presence in Oregon. As illustrated by these maps, most watersheds in Oregon contain or historically contained some species of mussel or snail. For this reason, DEQ does not see a compelling reason to propose site-specific criteria for waterbodies where mollusks may not be present as part of this rulemaking. See site-specific criteria development in Section IV for more information.

III.D. Acute Criteria

EPA included 120 acute studies in its derivation of acute criteria. There were 69 genera representing 52 invertebrates, 44 fish and 4 amphibians. The four species and the genus mean acute value (GMAV)[14] associated with each tested species from most to least sensitive are:

1. *Lasmigona subviridis*, Green Floater (GMAV= 23.41 mg TAN/L)
2. *Epioblasma capsaeformis*, Oyster mussel (GMAV= 31.14 mg TAN/L)
3. *Villosa iris*, Rainbow Mussel (GMAV= 34.23 mg TAN/L)
4. *Lampsilis* sp. (GMAV=46.63 mg TAN/L)

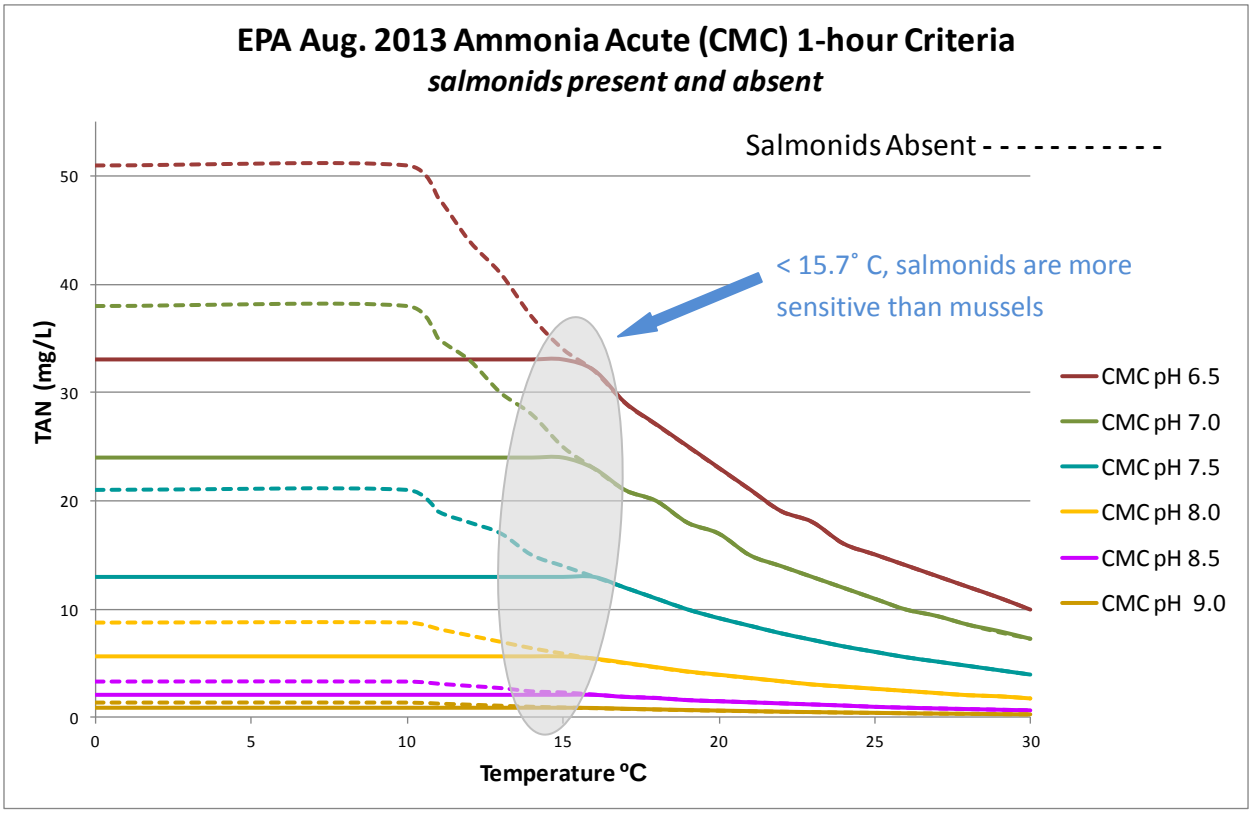
Although mussels are the most sensitive species in the dataset, at temperatures below 15.7°C, salmonid[15] sensitivity determines the acute criterion regardless of pH as shown in Figure 1. Appendix C, Table 1 compares sensitive species and associated acute criteria for EPA recommendations in 1999, 2009 and 2013.

[13] Email from Lisa Huff, EPA Headquarters to Kathleen Collins, EPA Region 10. June 9, 2014.

[14] Acute toxicity values from specific species toxicity tests are pooled together to calculate a geometric mean of the genus toxic concentration. This step is calculated as part of the EPA criteria derivation process. Generally, the lower the value the more toxic the chemical (in this case, ammonia) is to that species.

[15] Note that the Lost River Sucker found in the Klamath Basin ranked #9 among the most sensitive species in the acute dataset.

Figure 1: Salmonid sensitivity at lower temperatures

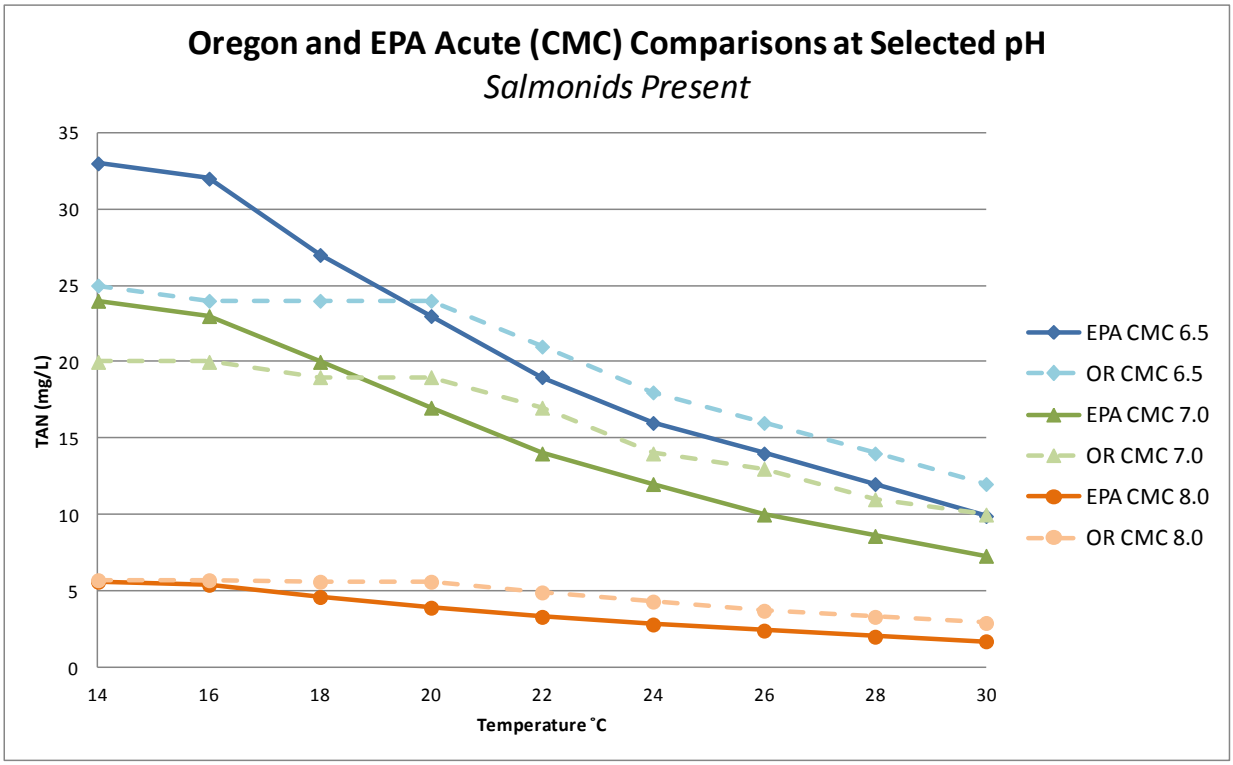


The frequency and duration of the acute criteria did not change from previous EPA recommendations. The one-hour average concentration of total ammonia nitrogen (in mg TAN/L) is not to be exceeded more than once every three years on average. At a pH of 7 and a temperature of 20˚C, the acute criterion is 17 mg/L TAN. For criteria based on different pH and temperatures, salmonids present and absent, and associated criteria equations, see Tables 1 and 2 in Appendix D.

III.E. Current and Proposed Acute Ammonia Criteria Comparison

Generally, EPA's updated acute criteria are more stringent than Oregon's current criteria, which DEQ based on EPA recommendations from 1985. However, at lower temperatures and pH, EPA's criteria are less stringent than Oregon's current acute criteria. Figure 2 below illustrates the difference in criteria at selected pH values and the presence of salmonids. Trout and salmon inhabit many waterbodies throughout Oregon.

Figure 2: Comparison between current and proposed acute ammonia criteria



III.F. Chronic Criteria

Ammonia chronic toxicity data were available for 21 species of freshwater organisms: 10 invertebrate species (mussels, clam, snail, cladocerans, daphnid and insect) and 11 fish species, including three federally listed salmonid species.

EPA calculated the chronic criterion based on the fifth percentile of the genus mean chronic values (GMCV) of the 21 tested species. The GMCVs for the four most sensitive species from most to least sensitive are:

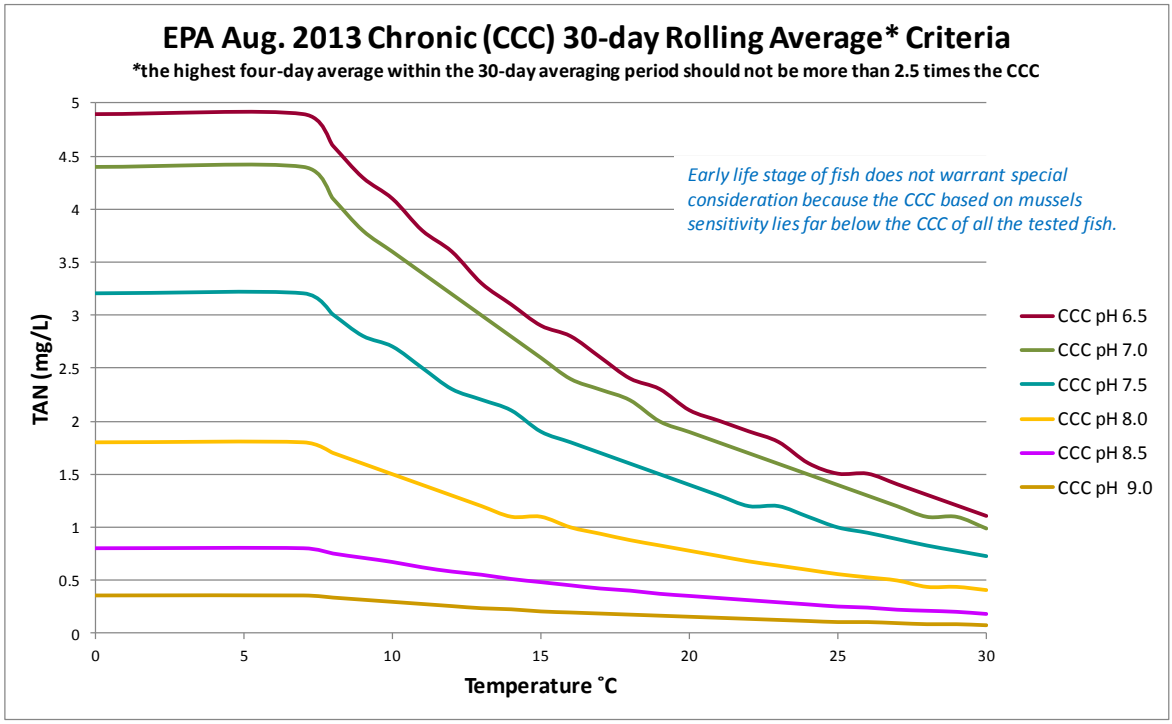
1. *Lampsilis* spp, Wavy-rayed lamp mussel and Fatmucket (GMCV=2.126 mg TAN/L*)*
2. *Villosa iris,* Rainbow mussel (GMCV= 3.501 mg TAN/L)
3. *Lepomis* spp., Bluegill and Green sunfish (GMCV= 6.920 mg TAN/L)
4. *Musculium transversum,* Long fingernailclam (GMCV= 7.547 mg TAN/L)

The chronic dataset ranks the pebblesnail as number five. Insects were the least sensitive in the chronic data, while salmonids had middle sensitivities. Because EPA based the chronic criteria on the effects of sensitive invertebrate species, including unionid mussels when mussels are present, the chronic criteria are protective of early life fish stages regardless of temperature. For this reason, criteria calculations to account for presence or absence of fish early life stages are not necessary. See

Appendix C, Table 2 for comparisons of sensitive species and associated chronic criteria in the EPA recommendations from 1999, 2009 and 2013.

The chronic averaging period changed from Oregon's current 1985 recommendations averaging period of 4 days to a period of 30 days. EPA recommended this change beginning with the 1999 update, although EPA allowed a 30-day averaging period in the 1985 recommendations if concentrations of ammonia had limited variability. EPA indicates that a 30-day averaging period continues to be appropriate, but that a 4-day averaging period is also necessary to align with the duration exposure specified in the 1985 Stephan et al Guidelines for chronic criteria, and as a basis for water quality based effluent limits. Further, it provides a limit in variability of ammonia concentrations. Based on 7-day toxicity tests on fathead minnows, EPA determined that the highest 4-day average within a 30-day period should not exceed 2.5 times the chronic criterion at a certain pH and temperature[16]. Therefore, if the chronic criterion at a pH of 7 and temperature of 20˚C is 1.9 mg/L TAN, the highest 4-day average within that 30 day period cannot exceed 4.8 mg/L TAN (i.e. 1.9 x 2.5). For criteria based on different pH and temperatures, including criteria formulas, see Table 3 in Appendix D. Figure 3 below shows the EPA's chronic criteria at selected pH values.

Figure 3: Proposed chronic criteria at selected pH values

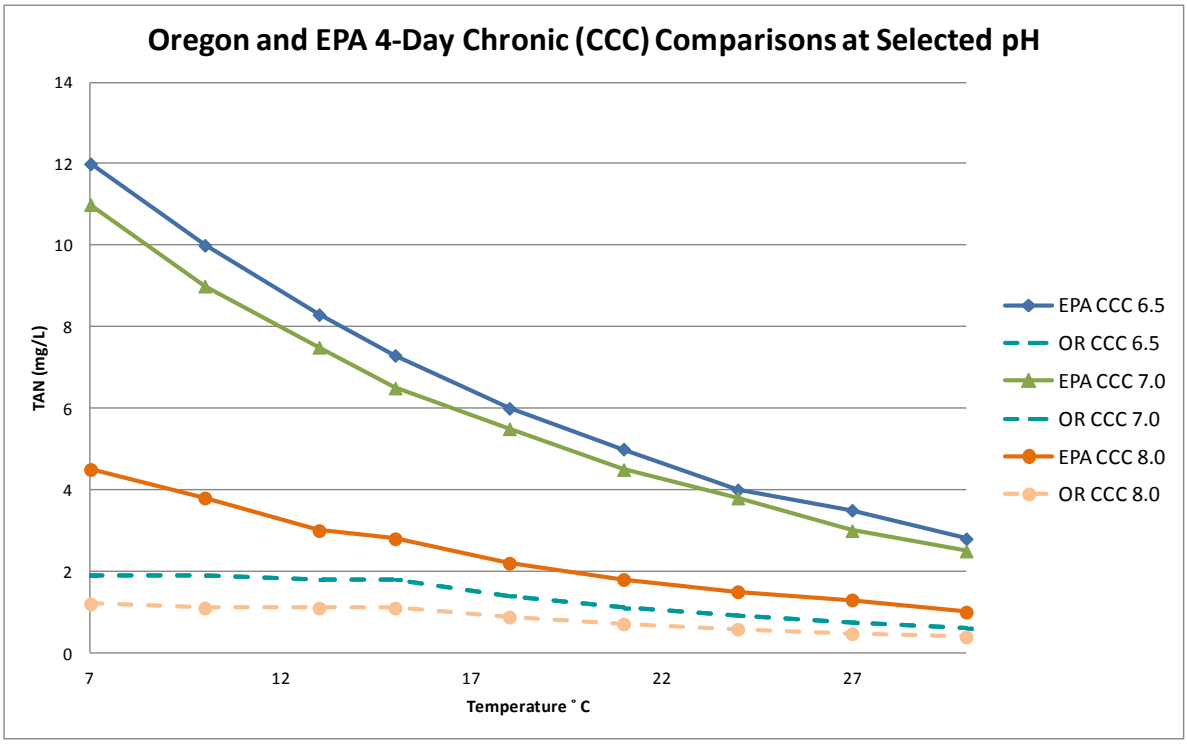


[16] For more information, see discussion starting on page 13 in EPA's 2013 Ammonia Criteria document.

III.G. Current and Proposed Chronic Ammonia Criteria Comparison

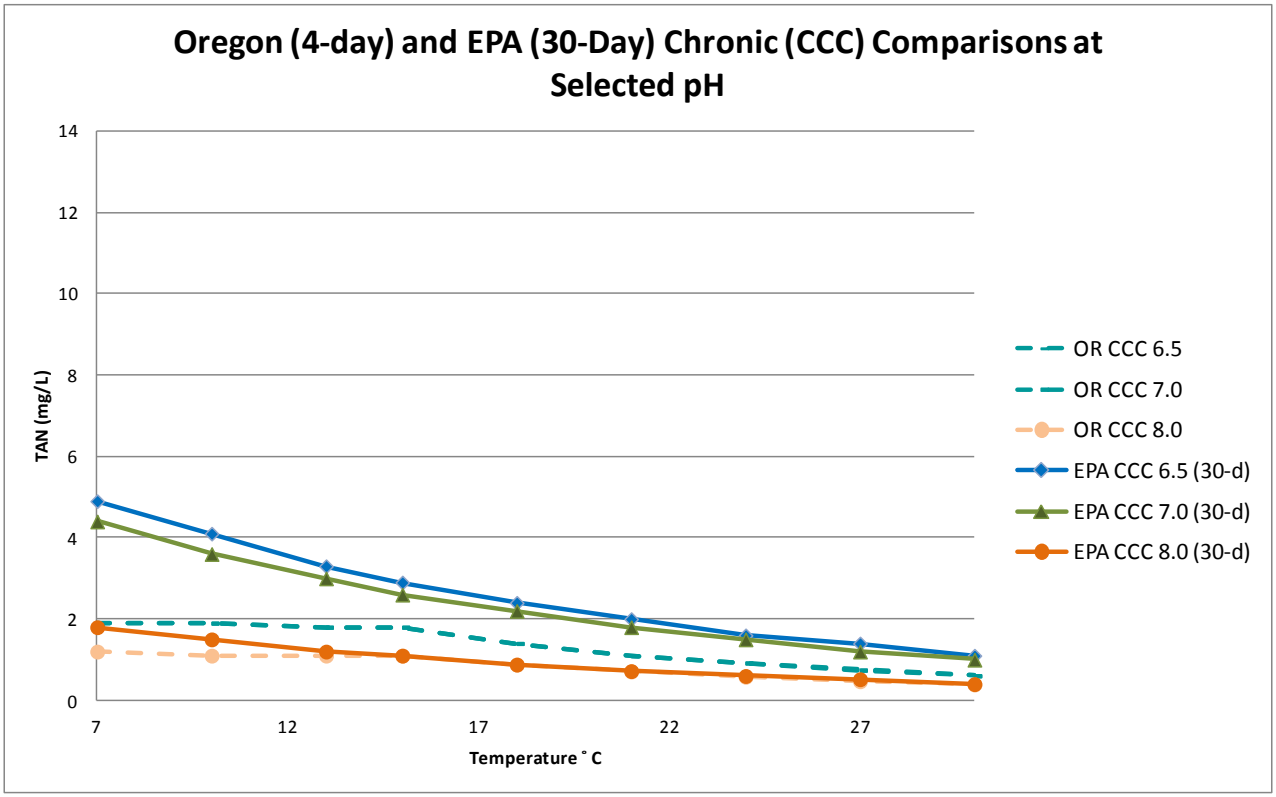
Generally, EPA's updated chronic criteria are less stringent than Oregon's current criteria based on EPA recommendations from 1985. Figure 4 below illustrates the difference in criteria at selected pH values. Since Oregon's current criteria do not use 30-day averaging, DEQ multiplied EPA criteria values at selected pH values by 2.5 (i.e. any 4-day average in a 30-day period cannot exceed 2.5 times the chronic criterion) to compare to Oregon's criteria based on a 4-day average. Figure 5 directly compares Oregon's criteria based on a 4-day average to EPA's criteria based on a 30-day average. The Figure 5 comparison shows that the criteria differences are not as great.

Figure 4: Comparison between current and proposed chronic ammonia criteria



Note: The graph above shows Oregon's ammonia chronic criteria at pH of 6.5 and 7.0 on one line because they are almost identical. The graph shows Oregon's criteria based on salmonid presence. Presence or absence of salmonids is not applicable for the proposed chronic criteria.

Figure 5: Comparison between current and proposed chronic ammonia criteria



Note: The graph above shows Oregon's ammonia chronic criteria at pH of 6.5 and 7.0 on one line because they are almost identical. The graph shows Oregon's criteria based on salmonid presence. Presence or absence of salmonids is not applicable for the proposed chronic criteria.

IV. SITE-SPECIFIC CRITERIA FOR AMMONIA

Similar to other water quality pollutants, Oregon may develop site-specific criteria for ammonia where there are demonstrated differences in sensitivity between the aquatic species that occur at the site and those used to derive the national criteria recommendations. The analysis must be based on a sound scientific rationale that protects the designated use and is subject to EPA review and approval.

In Appendix N of EPA's 2013 Criteria Document, EPA provided a species recalculation of the ammonia criteria where there are no mussels and there are no species at a site related to unionid mussels. EPA provided these alternate criteria due to the complexity of the relationship between ammonia toxicity and pH and temperature across different aquatic organisms. The removal of mussels from the national dataset results in criteria that are less stringent, but remain protective of the aquatic community residing at a site.

The procedure associated with removing mussels from the national dataset is the Recalculation Procedure[17]. The procedure:

- Allows deletion of nonresident tested species from the national dataset if they are not appropriate surrogates of resident untested species. Alternatively, the procedure could account for unique species at a waterbody site that EPA's national dataset did not represent. A state can then derive site-specific criteria to protect the aquatic species found at a particular site.
- May result in site-specific criteria that are either more or less stringent than EPA's recommended criteria

For more information about the Recalculation Procedure, see EPA's updated guidance: http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/upload/Revised-Deletion-Process-for-the-Site-Specific-Recalculation-Procedure-for-Aquatic-Life-Criteria.pdf.

As noted earlier, EPA must approve site-specific criteria. Any revised or new criteria/site-specific criteria proposed to protect aquatic life are also subject to ESA consultation requirements, which can complicate development of protective criteria. For example, EPA used toxicity data associated with salmonid species listed as threatened or endangered in Oregon in deriving national protective ammonia criteria, generally developed to protect 95 percent of aquatic species. If a discharger or other third party demonstrated that mussels were not present at a site and proposed site-specific criteria, EPA would still need to consult with NMFS and USFWS to assure protectiveness of any threatened or endangered species residing in Oregon. In addition, the biological assessments from NMFS, USFWS and EPA may have conflicting conclusions because of the differences in how NMFS and USFWS assess biological assessment data in comparison to EPA established methodologies in deriving national criteria.

V. BENEFICIAL USES AFFECTED

Criteria for ammonia apply to waterbodies where the "fish and aquatic life" beneficial use is designated. In addition, a different set of acute ammonia criteria apply to a waterbody based on the presence or absence of salmonids[18].

The fish use subcategories bulleted below include salmonid uses for Oregon waterbodies. Where any of these subcategories is a designated use for a waterbody, the more stringent ammonia criteria based on the presence of salmonids apply. The majority of Oregon's waterbodies support salmonid use.

[17] EPA. Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria. Office of Water. EPA-823-R-13-001. April 2013.

[18] OAR 340-041-0002(54) "Salmonid or Salmonids" means native salmon, trout, mountain whitefish and char including bull trout. For purposes of Oregon water quality standards, salmonid does not include brook or brown trout because they are introduced species.

- Bull trout spawning and juvenile rearing
- Core cold-water habitat
- Salmon and trout rearing and migration
- Salmon and steelhead migration corridor
- Redband or Lahontan Cutthroat Trout

Where salmonids are not a designated use, the stream's designated use is for either cool water species or Borax Lake chub. These areas include highly alkaline and saline lakes in Goose and Summer Lake subbasin, the lower portions of the Klamath, Malheur and Owyhee Rivers and a few other stream reaches, as shown on the fish use tables and maps at the link below. The less stringent acute criteria would apply in these waterbodies.

Because chronic toxicity tests show mussels are more sensitive than salmonid species, EPA did not need to develop chronic criteria to specifically protect early life stages of salmonids. In the situation where a site-specific chronic criterion is developed for ammonia based on mussels absent, then protection of early life stages of fish is necessary. Most waterbodies in Oregon support early life stages of fish.

Access fish use maps for Oregon here: http://www.deq.state.or.us/wq/standards/uses.htm.

VI. IMPLEMENTATION

VI.A. Determination of Mussels Absent

DEQ proposes to adopt EPA's criteria that protect mussels from ammonia impacts. Section IV describes the process to develop site-specific criteria when mussels are absent. This section briefly describes important considerations in EPA's Recalculation Procedure that DEQ would likely follow in evaluating cases where a third party requested site-specific criteria based on the absence of mussels.

Since EPA's Recalculation Procedure is dependent on what species occur at a site, it is important to distinguish a species being "resident" from a species "occurring at a site." EPA makes this distinction in the *Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria*[19]:

> "The terms "resident" and "occur at the site" include life stages and species that meet one of the following elements:
>
> - Are usually present at the site
> - Are present at the site only seasonally due to migration
> - Are present at the site intermittently because they periodically return to or extend their ranges into the site

[19] EPA. Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria. Office of Water. EPA-823-R-13-001. April 2013.

- Were present at the site in the past, are not currently present at the site due to degraded conditions, but are expected to return to the site when conditions improve, or
- Are present in nearby bodies of water, are not currently present at the site due to degraded conditions, but are expected to be present at the site when conditions improve.

The terms "resident" or "occur at the site" do not include life stages and species that meet one of the following elements:

- Were once present at the site but cannot exist at the site now due to permanent (physical) alterations of the habitat or other conditions that are not likely to change within reasonable planning horizons.
- Are still-water life stages or species that are found at a flowing-water site solely and exclusively because they are washed through the site by stream flow from a still-water site."

EPA's *Technical Support Document for Conducting and Reviewing Freshwater Mussel Occurrence Surveys for the Development of Site-specific Water Quality Criteria for Ammonia*[20] describes methods and approaches for conducting mussel surveys. EPA does not endorse one survey method over another, but the survey method must support a scientifically defensible rationale to demonstrate that mussels do not occur at a site.

This rulemaking does not recommend a specific mussel survey method for the purpose of potentially developing site-specific criteria for ammonia. If a discharger or other third party believes mussels may not be present at a site, methodologies described in EPA's document above would likely meet the scientific rigor needed to establish presence or absence of mussels. Other scientifically acceptable methods, such as those developed by Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service or the Xerces Society may meet survey objectives. If needed, DEQ may develop guidance on conducting mussel surveys following adoption of revised ammonia criteria.

VI.B. Permitting

The ammonia criteria are temperature and pH dependent, requiring that data for these physical parameters are available for both the effluent and the receiving water body. As temperature increases, the total ammonia criterion becomes progressively lower (more stringent), which can result in restrictive discharge limitations. However, the criterion at low temperatures can also be limiting because biological treatment of ammonia (NH_3 to NO_3 to N_2) is more difficult at low temperatures. The proposed acute criteria are generally more stringent than Oregon's current ammonia criteria, while the proposed chronic criteria are generally less stringent than Oregon's current criteria. Due to anti-backsliding rules, in cases where the proposed ammonia criteria result in effluent limits that are

[20] EPA. Technical Support Document for Conducting and Reviewing Freshwater Mussel Occurrence Surveys for the Development of Site-specific Water Quality Criteria for Ammonia. Office of Water. EPA 800-R-13-003. August 2013.

less restrictive than the current limits, DEQ would typically preserve the more stringent limits. There are some exceptions to this policy, including:

- EPA approved Total Maximum Daily Load and the TMDL contains less stringent effluent limitations than the permittee's current effluent limits, or
- Environmental Quality Commission approved pollutant load increase provided the increase is consistent with Clean Water Act 303(d)(4) or
- Permit meets one of the exceptions in CWA 402(o)(2).

The implementation of the proposed water quality criteria will not affect the National Pollutant Discharge Elimination System general permits because there are no ammonia limit requirements in these permits. There is an ammonia reference limit of 10 mg/L for the industrial stormwater permit (1200-Z) based on an EPA limit rather than state water quality standards. In the situation where a 1200Z permit holder discharges to a stream impaired for ammonia, DEQ would base the benchmark on the state water quality standard. Therefore, a revision to the state's ammonia criteria may affect 1200Z permits discharging to waterbodies currently impaired for ammonia or for future impairment listings.

The implementation of the proposed water quality criteria would affect the individual NPDES permit development process and permit requirements for design flows and monitoring requirements.

Design Flows

A typical part of the permit development process is to assess whether the effluent discharge has an effect on the receiving water body. DEQ typically evaluates this impact by conducting a reasonable potential analysis.

Currently, DEQ uses the following receiving stream design flows for the aquatic life toxics acute and chronic evaluation:

- Acute Criterion: 1Q10[21]
- Chronic Criterion: 7Q10[22]

EPA recommends use of one of the following design flows for determining compliance with the proposed acute and chronic ammonia criteria:

- Acute Criterion: 1B3[23] or 1Q10[19]
- Chronic Criterion: 30B3[24], 30Q10[25] or 30Q5[26]

[21] 1Q10: The lowest 1-day flow based on a ten-year return interval

[22] 7Q10: The lowest 7-day average flow based on a ten-year return interval

[23] 1B3: Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 1-day average flow when flow records are analyzed using EPA's 1986 DFLOW procedure

DEQ anticipates continuing use of the 1Q10 design flow to determine compliance with the proposed acute ammonia criteria. Depending upon the design flow selected for compliance with the chronic criteria, DEQ may require facilities to update their mixing zone studies to reflect the necessary design flow appropriately.[27] DEQ has not yet determined which design flow it will use to determine compliance with the proposed chronic criteria. If DEQ uses the 30Q5 design flow, which it currently uses to determine compliance with non-carcinogenic human health toxics criteria, it is likely that dischargers will not need to revise most mixing zone analyses[28]. However, if DEQ determines that one of the other design flows was more appropriate, it is likely that dischargers will need to revise current mixing zone analyses.

According to the EPA[29], if DEQ recommends using the 30Q5 flow to determine reasonable potential for the chronic ammonia criterion, the permit writer will need to ensure that the 7Q10 flow is protective of 2.5 times the chronic criterion, so that any short term, 4-day, flow variability within the 30-day averaging period does not lead to shorter-term chronic toxicity. If DEQ uses the 30B3 or the 30Q10 flow in the reasonable potential determination, the permit writer will not need to conduct this analysis.

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[24] 30B3: Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow when flow records are analyzed using EPA's 1986 DFLOW procedure

[25] 30Q10: The lowest 30-day average flow based on a ten-year return interval

[26] 30Q5: The lowest 30-day average flow based on a five-year return interval

[27] EPA Website:
http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/technical.cfm

[28] Municipalities that discharge less than 1.0 million gallons a day have not been required to characterize their effluent for human health criteria, so their mixing zone studies may not include dilutions for 30Q5 flow. In these cases, small municipalities may need to revise a mixing zone.

[29] EPA. Federal Register Notice. Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia; Notice. Wednesday, Dec. 22, 1999:
http://www.epa.gov/fedrgstr/EPA-WATER/1999/December/Day-22/w33152.pdf. Note that this document continues to be the latest guidance for implementing ammonia criteria for permitting purposes. EPA's 2013 recommended criteria do not contain updated permitting guidance.

Monitoring Requirements

There are currently two types of effluent monitoring required under NPDES permits. The first is characterization monitoring used in developing a permit to determine whether effluent limits are required. If effluent limits are required and subsequently included in an NPDES permit, DEQ then requires compliance monitoring to determine whether the discharger is meeting its effluent limits. The amount of monitoring required for both characterization and compliance monitoring varies based upon a facility's average design flows. For example, permits for larger facilities require more monitoring.

For characterization purposes, there is the potential that DEQ will require additional monitoring requirements for smaller facilities to ensure that there is sufficient data to adequately characterize the effluent and allow for averaging within a 30-day period. Additional data points will better characterize the discharge, minimize statistical error associated with the reasonable potential analysis, and help identify outliers.

Similarly, where DEQ establishes an ammonia effluent limit, DEQ may require additional compliance monitoring to demonstrate that "no 4-day average concentrations should exceed 2.5 times the chronic criterion."

VI.C. Integrated Report

Every two years, the Clean Water Act requires DEQ to assess water quality and report on the condition of Oregon's waters. DEQ prepares an Integrated Report that meets the requirements of the CWA for section 305(b) and section 303(d). Section 305(b) requires a report on the overall condition of Oregon's waters, while section 303(d) requires identifying waters that do not meet water quality standards and where DEQ needs to develop a Total Maximum Daily Load, TMDL, pollutant load allocation.

DEQ may:

- Add waterbodies to the 303(d) list, Category 5, based on the evaluation of new data, application of new or revised water quality standards, or information showing water quality has declined.
- Remove waterbodies from the 303(d) list when Oregon establishes TMDLs or other control measures, Categories 4A and 4B, respectively, that DEQ expects to improve water quality when data show water quality has improved.
- Remove waterbodies when Oregon revises water quality standards and data indicate that the waterbody is now attaining water quality standards.

The proposed ammonia criteria may affect current 303(d) listings for ammonia. DEQ's Integrated Report staff use the chronic criteria for ammonia to evaluate whether waterbodies are meeting state water quality standards. Based on the published 2010 Integrated Report, there are 15 waterbodies impaired for ammonia listed in Table 5. Five waterbodies need TMDLs and ten waterbodies have

approved TMDLs or other control measures in place. Because DEQ expects the proposed chronic criteria to be less stringent than Oregon's current chronic criteria for ammonia, DEQ may propose to delist waterbodies where there are current 303(d) listings if data shows that these waterbodies now meet ammonia criteria. DEQ will reassess waterbodies using the new ammonia criteria in the next cycle of the Integrated Report following EPA approval.

Table 5: Waterbodies Listed for Ammonia Based on the 2010 Integrated Report

Basin Name	Water Body (Stream/Lake)	Category	Status
Klamath	Klamath Strait	**5** Water quality limited, 303(d) list	TMDL needed
	Lost River	**5** Water quality limited, 303(d) list	TMDL needed
	Klamath River	**5** Water quality limited, 303(d) list	TMDL needed
	Klamath River / Ewauna, Lake	**5** Water quality limited, 303(d) list	TMDL needed
Willamette	Arata Creek / Blue Lake	**5** Water quality limited, 303(d) list	TMDL needed
Middle Columbia	Hermiston Ditch	**4A** Water quality limited	TMDL approved
	Umatilla River (2 records)	**4A** Water quality limited	TMDL approved
Southern Oregon Coastal	Ashland Creek	**4A** Water quality limited	TMDL approved
	North Myrtle Creek	**4B** Water quality limited	Other control measures
Willamette	Chicken Creek	**4A** Water quality limited	TMDL approved
	Dairy Creek	**4A** Water quality limited	TMDL approved
	McKay Creek	**4A** Water quality limited	TMDL approved
	Rock Creek	**4A** Water quality limited	TMDL approved
	Scoggins Creek	**4A** Water quality limited	TMDL approved
	Tualatin River	**4A** Water quality limited	TMDL approved

VI.D. Total Maximum Daily Load Program

A Total Maximum Daily Load (TMDL) is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. If DEQ includes a waterbody on the 303(d) list, DEQ must develop a TMDL, or other control measures in limited circumstances, to bring the waterbody back into compliance by meeting water quality standards. Through an extensive evaluation, DEQ develops pollutant allocations for point and nonpoint sources for the pollutant of concern.

As indicated in Table 5 above, several waterbodies need TMDLs for ammonia listings. In addition, there are a number of waterbodies where DEQ has already developed TMDLs to address ammonia impairments. Following adoption and subsequent EPA approval of revised ammonia criteria, DEQ will likely need to re-assess wasteload and load allocations that DEQ developed for existing ammonia TMDLs to evaluate whether the existing pollutant allocations are still appropriate. For example, it is not yet clear whether Waste Load Allocations will be based on the chronic 30-day rolling average, the 2.5 times the chronic criterion four-day average within the 30-day rolling average, or even the acute criteria duration based on a one-hour average. Waste load allocations may need to be based on both, with different compliance averaging periods. For example, DEQ could base one waste load allocation on a maximum monthly four-day average and the other on a maximum one-day average.

APPENDIX A: EPA LETTER TO OREGON DEQ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
WATER AND
WATERSHEDS

May 16, 2014

Ms. Wendy Wiles
Administrator, Environmental Solutions Division
Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204-1390

Re: U.S. Environmental Protection Agency 304(a) Recommendations for Ammonia and Recreational Criteria

Dear Ms. Wiles:

I would like to take this opportunity to highlight the EPA's recent publication of final ammonia and recreational water quality criteria recommendations, and urge you to consider adoption of these criteria into Oregon's water quality standards. These published criteria documents reflect, once again, the EPA's commitment to improving and updating the science bolstering protection of our Nation's water resources.

As you know, the EPA's water quality standards regulations at 40 CFR 131.11(a)(i) require states and authorized tribes to adopt protective criteria that are based on sound scientific rationale. The publication of the EPA recommendations under Clean Water Act (CWA) section 304(a) provides an excellent opportunity for you and your stakeholders to review existing water quality criteria and determine whether those existing criteria are still, in fact, protective and based on sound scientific rationale. I encourage you to use your triennial review process (required by 40 CFR 131.20(a)) and other opportunities for stakeholder input to provide a venue for public feedback on the need to adopt new or modify existing water quality standards to reflect the latest science. The EPA is available to offer support and technical assistance as you consider adoption of these criteria revisions.

The EPA's CWA section 304(a) criteria recommendations provide scientific recommendations to states and authorized tribes in developing new or revised water quality standards. States and authorized tribes have the discretion to adopt the EPA's criteria recommendations; the EPA's recommendations modified to reflect site-specific conditions; or criteria based on other scientifically defensible methods.

The EPA last issued final ambient water quality criteria recommendations for recreational waters in 1986 and for ammonia in 1999. The new water quality criteria reflect significant research on these pollutants and the levels that are protective of designated uses. Because both of these published criteria rely on the latest research and science, I encourage you, when re-examining your water quality standards during the next triennial review, to consider adoption of these criteria into your water quality standards. If, after you review your existing water quality standards, you conclude that updates to your ammonia and recreational water quality standards are not necessary to protect the designated uses, I urge you to submit your rationale for not making a change in your triennial review.

Recreational Water Quality Criteria

The EPA developed the recreational water quality criteria, which apply to all waters designated for primary contact recreation, based on a review of historic studies and more recent scientific information including the National Epidemiological and Environmental Assessment of Recreational water studies at U.S. beaches in 2003, 2004, 2005, 2007, and 2009. The studies enrolled 54,250 participants, encompassed nine locations, and collected and analyzed numerous samples from a combination of fresh, marine, tropical, and temperate waters. The resulting criteria have numerous improvements over the 1986 criteria, for example:

- The criteria consist of both a geometric mean and statistical threshold value.
- The criteria now comprise a magnitude, duration, and frequency.
- States and authorized tribes may choose from two different sets of recommended criteria values to protect primary contact recreation waters.
- The criteria recommendations for fresh and marine waters are based on the same illness rate.
- The criteria no longer refer to different use intensities.
- States may take advantage of newly-developed rapid test (qPCR) methods in adopting WQS.
- The criteria document provides Beach Action Values for beach notification programs.

As you know, as a BEACH Act state, Oregon has specific requirements regarding recreational water quality criteria. Section 303(i)(l)(B) of the Clean Water Act (as amended by the BEACH Act of 2000) directs each state or authorized tribe with coastal recreational waters to adopt and submit to the EPA new or revised water quality standards for those waters for all pathogens and pathogen indicators to which the new or revised water quality criteria are applicable. The deadline for state or tribal adoption and submittal to EPA of revised WQS is three years from EPA publication of new recommendations. Since EPA published final recreational water quality criteria recommendations in December 2012, BEACH Act states and authorized tribes should complete this action by December 2015.

As noted above, the revised recreational water quality criteria now comprise a magnitude, duration, and frequency. The EPA's revised recreational water quality criteria are:

- **Magnitude:** Select one of two sets of criteria, consisting of a geometric mean (GM) and a related statistical threshold value (STV), which are associated with two different illness rates, as indicated in the table below.

- **Duration and Frequency:** Include duration and frequency of excursion as a component of the state's or authorized tribe's water quality standards. For duration, the GM of a waterbody should not be greater than the selected GM in any 30-day interval. For frequency, no more than 10% of the samples should exceed the STV within those 30 days.

36 illnesses per 1,000 primary contact recreators		32 illnesses per 1,000 primary contact recreators	
GM (cfu/100 mL)	STV (cfu/100 mL)	GM (cfu/100 mL)	STV (cfu/100 mL)
126EC	410EC	100 EC	320EC

You can find more information on the 2012 recreational water quality criteria on the EPA's website, at http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/.

Ammonia Criteria

In updating the 1999 ammonia criteria, the EPA conducted an extensive literature review that incorporates new toxicity data from 69 studies, including new data on freshwater mussels and gill-bearing snails, which are both sensitive to ammonia toxicity. In particular, the freshwater mussels are more sensitive to ammonia than the organisms included in the 1999 criteria dataset. You can find more information on the 2013 ammonia water quality criteria on the EPA's website, at http://water.epa.gov/scitech/swguidance/standards/criteria/aglife/ammonia/. In addition, we encourage you to contact the EPA to discuss the various approaches to consider when adopting the revised ammonia criteria.

In summary, I hope these new criteria recommendations provide you with information to move forward as you consider changes to your water quality standards in the near future. I appreciate your commitment to protecting water quality and look forward to continuing to work collaboratively towards our mutual goals. If you have any additional questions, please feel free to contact Angela Chung, the Region 10 Water Quality Standards Unit Manager, at (206) 553-6511.

Sincerely,

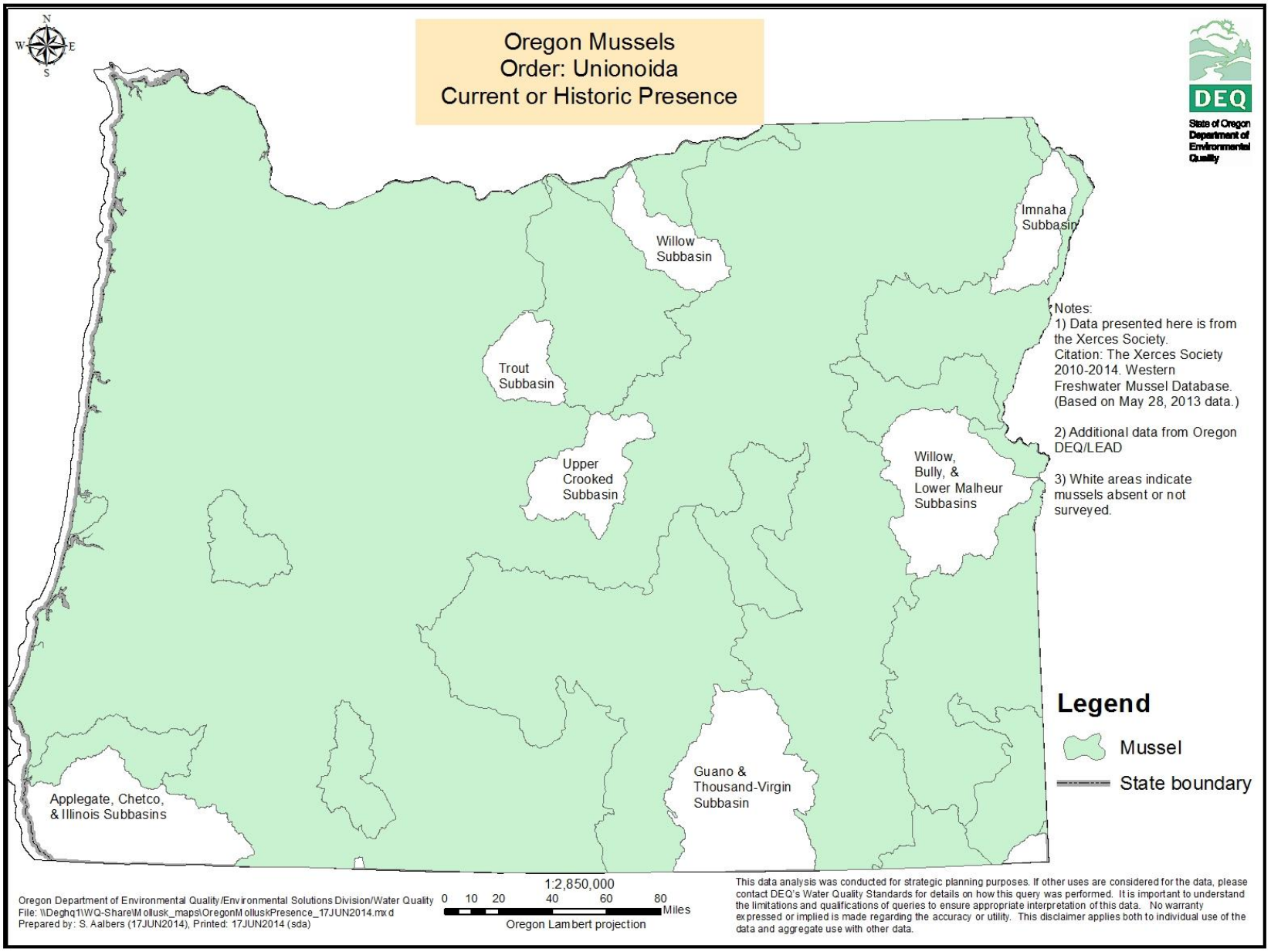
Angela Chung for

Daniel D. Opalski, Director
Office of Water and Watersheds

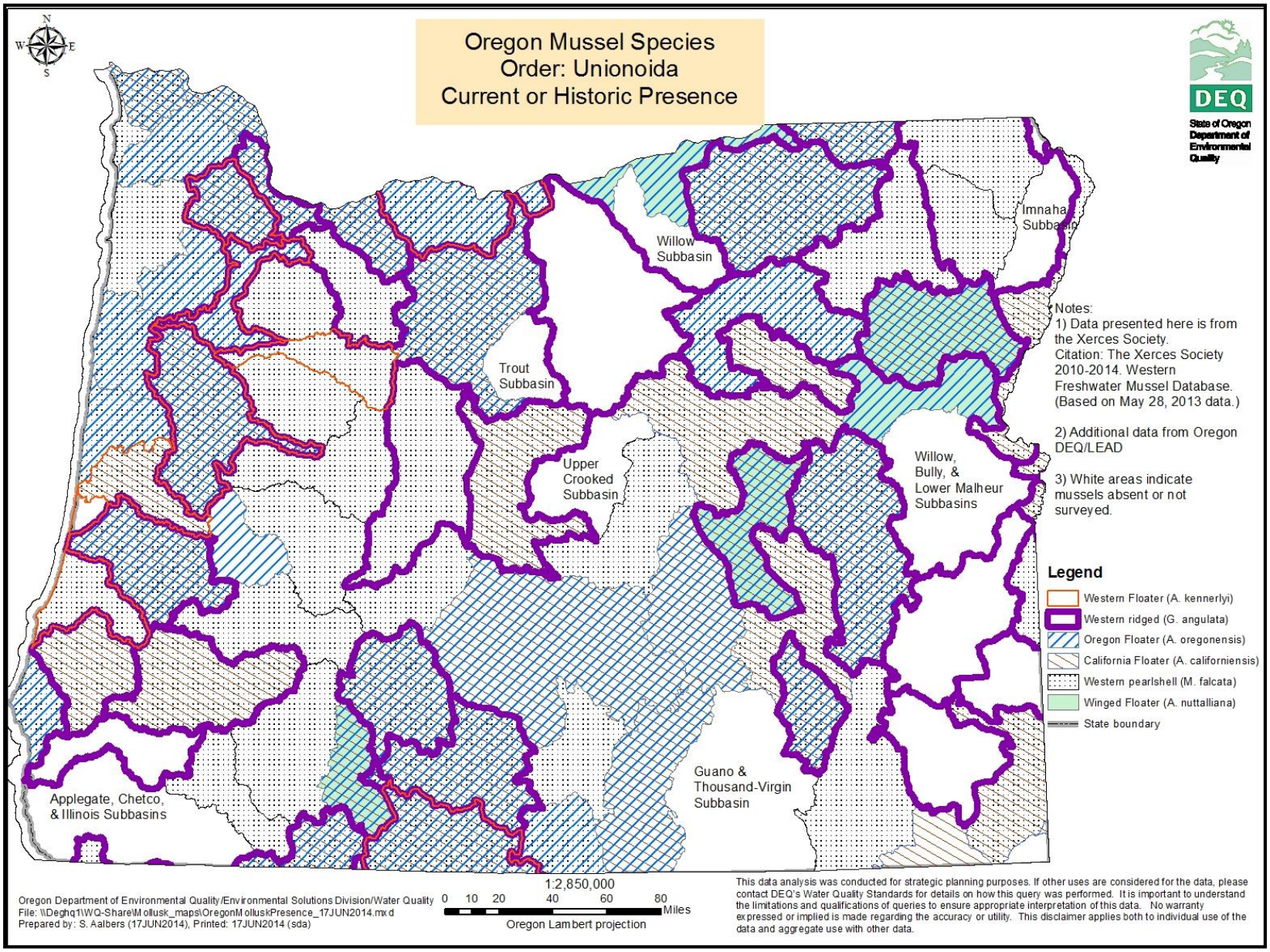
cc: Ms. Jennifer Wigal, Acting Assistant Director
Oregon Department of Environmental Quality

Ms. Debra Sturdevant, Acting Water Quality Standards and Assessments Program Manager
Oregon Department of Environmental Quality

APPENDIX B: PRESENCE OF MUSSELS AND SNAILS IN OREGON


Oregon Mussels
Order: Unionoida
Current or Historic Presence
DEQ
State of Oregon Department of Environmental Quality
Willow Subbasin
Imnaha Subbasin
Trout Subbasin
Upper Crooked Subbasin
Willow, Bully, & Lower Malheur Subbasins
Guano & Thousand-Virgin Subbasin
Applegate, Chetco, & Illinois Subbasins
Notes:
1) Data presented here is from the Xerces Society.
Citation: The Xerces Society 2010-2014. Western Freshwater Mussel Database. (Based on May 28, 2013 data.)
2) Additional data from Oregon DEQ/LEAD
3) White areas indicate mussels absent or not surveyed.
Legend
Mussel
State boundary
1:2,850,000
0 10 20 40 60 80
Miles
Oregon Lambert projection
Oregon Department of Environmental Quality/Environmental Solutions Division/Water Quality
File: \\Deghq1\WQ-Share\Mollusk_maps\OregonMolluskPresence_17JUN2014.mxd
Prepared by: S. Aalbers (17JUN2014), Printed: 17JUN2014 (sda)
This data analysis was conducted for strategic planning purposes. If other uses are considered for the data, please contact DEQ's Water Quality Standards for details on how this query was performed. It is important to understand the limitations and qualifications of queries to ensure appropriate interpretation of this data. No warranty expressed or implied is made regarding the accuracy or utility. This disclaimer applies both to individual use of the data and aggregate use with other data.

]


Oregon Mussel Species
Order: Unionoida
Current or Historic Presence
DEQ
State of Oregon Department of Environmental Quality
Willow Subbasin
Imnaha Subbasin
Trout Subbasin
Upper Crooked Subbasin
Willow, Bully, & Lower Malheur Subbasins
Guano & Thousand-Virgin Subbasin
Applegate, Chetco, & Illinois Subbasins
Notes:
1) Data presented here is from the Xerces Society.
Citation: The Xerces Society 2010-2014. Western Freshwater Mussel Database. (Based on May 28, 2013 data.)
2) Additional data from Oregon DEQ/LEAD
3) White areas indicate mussels absent or not surveyed.
Legend
Western Floater (A. kennerlyi)
Western ridged (G. angulata)
Oregon Floater (A. oregonensis)
California Floater (A. californiensis)
Western pearlshell (M. falcata)
Winged Floater (A. nuttalliana)
State boundary
1:2,850,000
0 10 20 40 60 80
Miles
Oregon Lambert projection
Oregon Department of Environmental Quality/Environmental Solutions Division/Water Quality
File: \\Deghq1\WQ-Share\Mollusk_maps\OregonMolluskPresence_17JUN2014.mxd
Prepared by: S. Aalbers (17JUN2014), Printed: 17JUN2014 (sda)
This data analysis was conducted for strategic planning purposes. If other uses are considered for the data, please contact DEQ's Water Quality Standards for details on how this query was performed. It is important to understand the limitations and qualifications of queries to ensure appropriate interpretation of this data. No warranty expressed or implied is made regarding the accuracy or utility. This disclaimer applies both to individual use of the data and aggregate use with other data.

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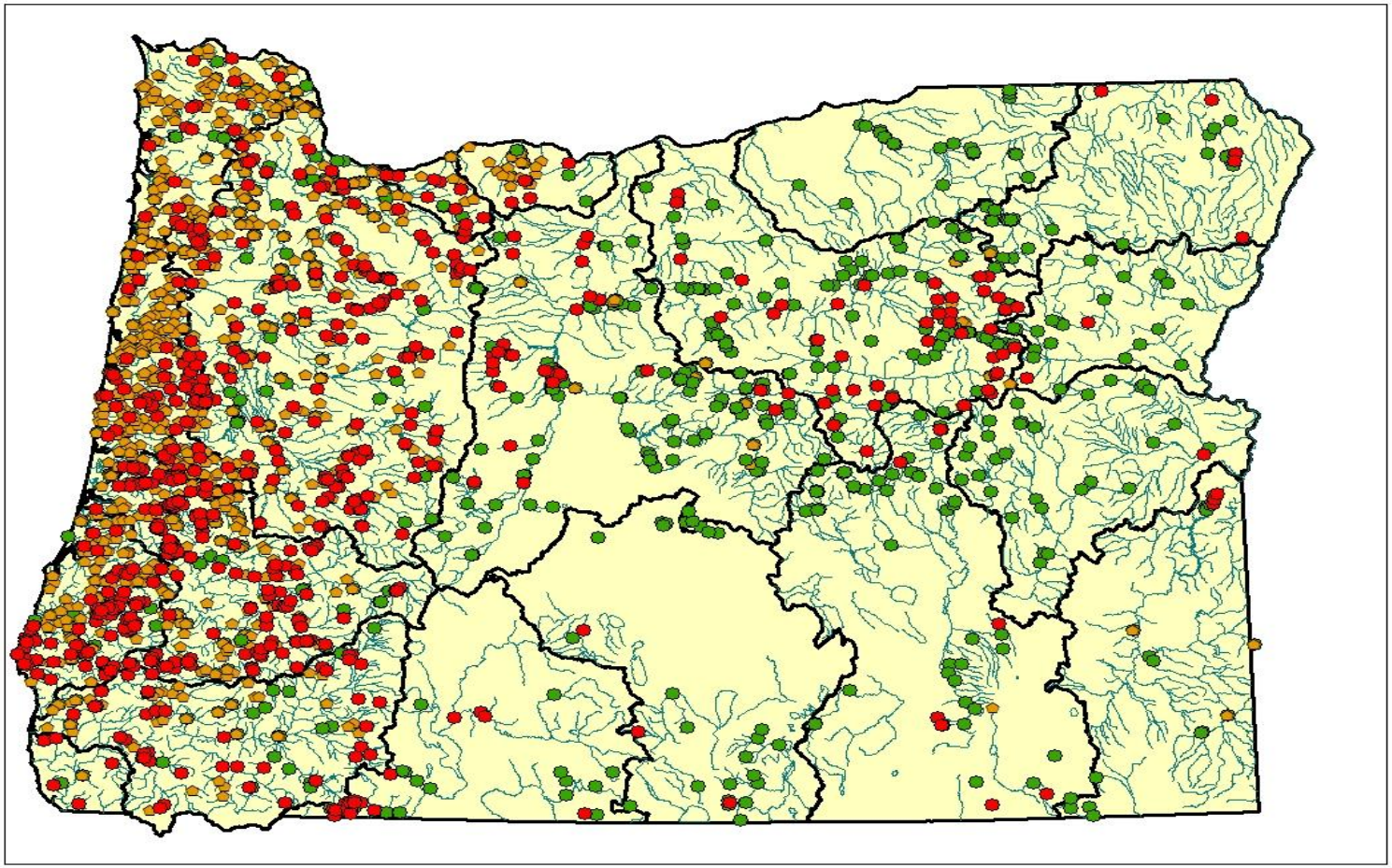
Oregon Snail Presence



Pulmonate snails

- DEQ database
- WMC database

Non-pulmonate (gilled) snails

- DEQ database
- WMC database

WMC = Western Monitoring Center

APPENDIX C: COMPARISON OF SPECIES USED TO CALCULATE THE ACUTE AND CHRONIC CRITERIA FROM EPA 2013 CRITERIA DOCUMENT

Table 1
Comparison of the four taxa used to calculate the final acute value (FAV) and CMC in the 1999, 2009 Draft and 2013 EPA criteria

1999 Update CMC Magnitude			2009 Draft Update CMC Magnitude			2013 Final CMC Magnitude	
Species	pH 8.0, T=25°C (mgN/L)	pH 7.0, T=20°C (mgN/L)	Species	pH 8.0, T=25°C (mg TAN/L)	pH 7.0, T=20°C (mg TAN/L)	Species	pH 7.0, T=20°C (mg TAN/L)
Oncorhynchus sp. (salmonids), includes: O. aquabonita, O. clarkii, O. gorbuscha, O. kisutch, O. mykiss, and O. tshawytscha	21.95	99.15	Oyster mussel, Epioblasma capsaeformis	6.037	39.24	Lampsilis sp. (Unionidae), includes: L. abrupta, L. cardium, L. fasciola, L. higginsii, L. rafinesqueana, and L. siliquoidea	46.63
Orangethroat darter, Etheostoma spectabile	17.96	74.25	Asiatic clam, Corbicula fluminea	6.018	39.12	Rainbow mussel, Villosa iris	34.23
Golden shiner, Notemigonus crysoleucas	14.67	63.02	Lampsilis sp. (Unionidae), includes: L. abrupta, L. cardium, L. fasciola, L. higginsii, L. rafinesqueana, and L. siliquoidea	5.919	38.48	Oyster mussel, Epioblasma capsaeformis	31.14
Mountain whitefish, Prosopium williamsoni	12.11	51.93	Rainbow mussel, Villosa iris	5.036	32.73	Green floater, Lasmigona subviridis	23.41
FAV[30]	11.23	48.21	FAV	5.734	37.27	FAV	33.52

[30] The FAV in the 1999 AWQC document of 11.23 mg TAN/L at pH 8 was lowered to the geometric mean of these seven LC50 values at the time in order to protect large rainbow trout which were shown in Thurston and Russo (1983) to be measurably more sensitive than other life stages. The FAV prior to adjusting it to protect the commercially and recreationally important adult rainbow trout was calculated to be 14.32 mg TAN/L (CMC = 7.2 mg TAN/L) at pH 8. This FAV based on protection of adult rainbow trout at pH 7 is 48.21 mg TAN/L (see also Appendix A in this document).

CMC	5.6	24	CMC	2.9	19	CMC	17	

Table 2
Comparison of the four taxa used to calculate the final chronic value (FCV) and CCC in the 1999 Update, 2009 Draft and the 2013 EPA criteria

1999 Update CCC Magnitude			2009 Draft Update CCC Magnitude			2013 Final CCC Magnitude	
Species	pH 8.0, T=25°C (mg TAN/L)	pH 7.0, T=20°C (mg TAN/L)	Species	pH 8.0, T=25°C (mg TAN/L)	pH 7.0, T=20°C (mg TAN/L)	Species	pH 7.0, T=20°C (mg TAN/L)
Fathead minnow, Pimephales promelas	3.09	7.503	Long fingernail clam, Musculium transversum	<2.260	7.552	Long fingernail clam, *Musculium transversum*	7.547
Lepomis sp. (Centrarchidae), includes: Bluegill sunfish, *L. macrochirus*, and Green sunfish, L. cyanellus	2.85	6.92	*Lepomis* sp. (Centrarchidae), includes: Bluegill sunfish, *L. macrochirus*, and Green sunfish, L. cyanellus	2.852	6.924	*Lepomis* sp. (Centrarchidae), includes: Bluegill sunfish, *L. macrochirus*, and Green sunfish, L. cyanellus	6.92
Long fingernail clam, *Musculium transversum*	<2.26	7.547	Rainbow mussel, Villosa iris	<0.9805	3.286	Rainbow mussel, Villosa iris	3.501
Amphipod, Hyalella azteca	<1.45	4.865	*Lampsilis* sp. (Unionidae), includes: Wavy-rayed lamp mussel, *L. fasciola* and Fatmucket, *L. siliquoidea*	<0.3443	1.154	*Lampsilis* sp. (Unionidae), includes: Wavy-rayed lamp mussel, *L. fasciola* and Fatmucket, *L. siliquoidea*	2.216
CCC	1.2	4.5	CCC	0.26	0.91	CCC	1.9

APPENDIX D: AMMONIA CRITERIA TABLES

AMMONIA FRESHWATER CRITERIA TABLES

DEQ based the following proposed Tables 30(a)-(c) on EPA's April 2013 document, *Aquatic Life Ambient Water Quality Criteria for Ammonia* – Freshwater 2013, Office of Water (EPA 822-R-13-001.).

Table 30(a): Ammonia Acute Criteria Values (One-hour Average)—Salmonid Species Present Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

Criteria cannot be exceeded more than once every three years

$$Acute\ Criterion = MIN\left(\left(\frac{0.275}{1+10^{7.204-pH}}+\frac{39.0}{1+10^{pH-7.204}}\right),\left(0.7249\times\left(\frac{0.0114}{1+10^{7.204-pH}}+\frac{1.6181}{1+10^{pH-7.204}}\right)\times\left(23.12\times 10^{0.036\times(20-T)}\right)\right)\right)$$

	Temperature (°C)																
pH	**0-14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	33	33	32	29	27	25	23	21	19	18	16	15	14	13	12	11	9.9
6.6	31	31	30	28	26	24	22	20	18	17	16	14	13	12	11	10	9.5
6.7	30	30	29	27	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0
6.8	28	28	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5
6.9	26	26	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9
7.0	24	24	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	8.0	7.3
7.1	22	22	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7
7.2	20	20	19	18	16	15	14	13	12	11	9.8	9.1	8.3	7.7	7.1	6.5	6.0
7.3	18	18	17	16	14	13	12	11	10	9.5	8.7	8.0	7.4	6.8	6.3	5.8	5.3
7.4	15	15	15	14	13	12	11	9.8	9.0	8.3	7.7	7.0	6.5	6.0	5.5	5.1	4.7
7.5	13	13	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4.0
7.6	11	11	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	9.6	9.6	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	3.0
7.8	8.1	8.1	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.2	2.9	2.7	2.5
7.9	6.8	6.8	6.6	6.0	5.6	5.1	4.7	4.3	4.0	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8.0	5.6	5.6	5.4	5.0	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6	2.4	2.2	2.0	1.9	1.7
8.1	4.6	4.6	4.5	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4
8.2	3.8	3.8	3.7	3.5	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	3.1	3.1	3.1	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.96
8.4	2.6	2.6	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79
8.5	2.1	2.1	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.90	0.83	0.77	0.71	0.65
8.6	1.8	1.8	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.96	0.88	0.81	0.75	0.69	0.63	0.59	0.54
8.7	1.5	1.5	1.4	1.3	1.2	1.1	1.0	0.94	0.87	0.80	0.74	0.68	0.62	0.57	0.53	0.49	0.45

8.8	1.2	1.2	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1.0	1.0	1.0	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.40	0.37	0.34	0.32
9.0	0.88	0.88	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

Table 30(b): Ammonia Acute Criteria Values (One-hour Average*)—Salmonid Species Absent
Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

Criteria cannot be exceeded more than once every three years

$$Acute\ Criterion = 0.7249 \times \frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}} \times MIN\left(51.93, 23.12 \times 10^{0.036\times(20-T)}\right)$$

	Temperature (°C)																				
pH	**0-10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	51	48	44	41	37	34	32	29	27	25	23	21	19	18	16	15	14	13	12	11	9.9
6.6	49	46	42	39	36	33	30	28	26	24	22	20	18	17	16	14	13	12	11	10	9.5
6.7	46	44	40	37	34	31	29	27	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0
6.8	44	41	38	35	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.2	8.5
6.9	41	38	35	32	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9
7.0	38	35	33	30	28	25	23	21	20	18	17	15	14	13	12	11	10	9.4	8.6	7.9	7.3
7.1	34	32	30	27	25	23	21	20	18	17	15	14	13	12	11	10	9.3	8.5	7.9	7.2	6.7
7.2	31	29	27	25	23	21	19	18	16	15	14	13	12	11	9.8	9.1	8.3	7.7	7.1	6.5	6.0
7.3	27	26	24	22	20	18	17	16	14	13	12	11	10	9.5	8.7	8.0	7.4	6.8	6.3	5.8	5.3
7.4	24	22	21	19	18	16	15	14	13	12	11	9.8	9.0	8.3	7.7	7.0	6.5	6.0	5.5	5.1	4.7
7.5	21	19	18	17	15	14	13	12	11	10	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4.0
7.6	18	17	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	15	14	13	12	11	10	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	2.9
7.8	13	12	11	10	9.3	8.5	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.2	2.9	2.7	2.5
7.9	11	9.9	9.1	8.4	7.7	7.1	6.6	3.0	5.6	5.1	4.7	4.3	4.0	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8.0	8.8	8.2	7.6	7.0	6.4	5.9	5.4	5.0	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6	2.4	2.2	2.0	1.9	1.7
8.1	7.2	6.8	6.3	5.8	5.3	4.9	4.5	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4
8.2	6.0	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	4.9	4.6	4.3	3.9	3.6	3.3	3.1	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.96
8.4	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79
8.5	3.3	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.90	0.83	0.77	0.71	0.65
8.6	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.96	0.88	0.81	0.75	0.69	0.63	0.58	0.54
8.7	2.3	2.2	2.0	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.94	0.87	0.80	0.74	0.68	0.62	0.57	0.53	0.49	0.45

8.8	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.40	0.37	0.34	0.32
9.0	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

Table 30(c): Ammonia Chronic Criteria Values (30-day Rolling Average*)

Temperature and pH-Dependent and expressed as Total Ammonia Nitrogen (mg/L TAN)

* The highest four-day average within the 30-day averaging period must not be more than 2.5 times the chronic value

Criteria cannot be exceeded more than once every three years

$$Chronic\ Criterion = 0.8876 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times \left(2.126 \times 10^{0.028\times(20-MAX(T,7))}\right)$$

	Temperature (°C)																							
pH	**0-7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
6.5	4.9	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.5	1.4	1.3	1.2	1.1
6.6	4.8	4.5	4.3	4.0	3.8	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1
6.7	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1
6.8	4.6	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1
6.9	4.5	4.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0
7.0	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	0.99
7.1	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95
7.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.96	0.90
7.3	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.97	0.91	0.85
7.4	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.96	0.90	0.85	0.79
7.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.83	0.78	0.73
7.6	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.1	0.98	0.92	0.86	0.81	0.76	0.71	0.67
7.7	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.60
7.8	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53
7.9	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.50	0.47
8.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.60	0.56	0.53	0.50	0.44	0.44	0.41
8.1	1.5	1.5	1.4	1.3	1.2	1.1	1.1	0.99	0.92	0.87	0.81	0.76	0.71	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35
8.2	1.3	1.2	1.2	1.1	1.0	0.96	0.90	0.84	0.79	0.74	0.70	0.65	0.61	0.57	0.54	0.50	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.30
8.3	1.1	1.1	0.99	0.93	0.87	0.82	0.76	0.72	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26
8.4	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.50	0.47	0.44	0.41	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.25	0.23	0.22
8.5	0.80	0.75	0.71	0.67	0.62	0.58	0.55	0.51	0.48	0.45	0.42	0.40	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.24	0.22	0.21	0.20	0.18

8.6	0.68	0.64	0.60	0.56	0.53	0.49	0.46	0.43	0.41	0.38	0.36	0.33	0.31	0.29	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.16	0.15
8.7	0.57	0.54	0.51	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13
8.8	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26	0.24	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.13	0.12	0.11
8.9	0.42	0.39	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.09
9.0	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.11	0.10	0.09	0.09	0.08