U.S. ENVIRONMENTAL PROTECTION AGENCY – REGION 10

Technical Support Document

for Action on the State of Oregon's New and Revised Human Health Water Quality Criteria for Toxics and Revisions to Narrative Toxics Provisions Submitted on July 8, 2004

June 1, 2010

Technical Support Document

for Action on the State of Oregon's New and Revised Human Health Water Quality Criteria for Toxics and Revisions to Narrative Toxics Provisions Submitted on July 8, 2004

Contents

I. INTRODUCTION 1

II. BACKGROUND 2

A. CLEAN WATER ACT REQUIREMENTS FOR WATER QUALITY STANDARDS 2
B. OVERVIEW OF OREGON'S JULY 8, 2004, WQS SUBMISSION 3

III. NEW AND REVISED HUMAN HEALTH WATER QUALITY CRITERIA 4

A. NEW AND REVISED HUMAN HEALTH CRITERIA FOR NON-CARCINOGENS 7
1. "Water + Organism" and "Organism Only" Criteria Identified in Table 3 8
a) Criteria Derivation 8
b) EPA Review and Action 12
(1) Review of Values Used to Calculate Criteria 12
(2) Evaluation of Level of Protection Provided by Criteria 13
(3) Disapproval 14
2. Methylmercury 17
a) Criterion Derivation 17
b) EPA Review and Action 18
(1) Review of Values Used to Calculate Criterion 18
(2) Evaluation of Level of Protection Provided by Criterion 19
(3) Disapproval 20
3. Copper 20
a) Criterion Derivation 20
b) EPA Review and Action 20
(1) Protectiveness Evaluation 20
(2) Approval 21
B. NEW AND REVISED HUMAN HEALTH CRITERIA FOR CARCINOGENS 21
1. "Water + Organism" and "Organism Only" Criteria Identified in Table 10 21
a) Criteria Derivation 21
b) EPA Review and Action 24
(1) Review of Values Used to Calculate Criteria 24
(2) Evaluation of Level of Protection Provided by Criteria 25
(3) Risk Level Evaluation in Light of the Available Local and Regional Fish Consumption Rate Data 26
(4) Disapproval 28
2. Asbestos 28
a) Criterion Derivation 28
(1) Protectiveness Evaluation 28
b) EPA Review and Action 28
(1) Protectiveness Evaluation 28
(2) Approval 29

IV. NEW FOOTNOTES 29

A. FOOTNOTE I 29
1. Description of Footnote 29
2. EPA Review and Action 30
B. FOOTNOTE K 30
1. Description of Footnote 30
2. EPA Review and Action 30
C. FOOTNOTE R 31
1. Description of Footnote 31
2. EPA Review and Action 32
D. FOOTNOTE U 32
1. Description of Footnote 32
2. EPA Review and Action 32

V. WITHDRAWAL OF HUMAN HEALTH WATER QUALITY CRITERIA FOR EIGHT TOXIC POLLUTANTS 33

A. DESCRIPTION OF WITHDRAWN CRITERIA 33
1. Beryllium 33
2. Cadmium 34
3. Chromium III 34
4. Chromium VI 34
5. Lead 34
6. Mercury 35
7. Silver 35
8. Trichloroethane 1,1,1- 35
B. EPA REVIEW AND ACTION 36

VI. REVISIONS TO NARRATIVE TOXICS PROVISIONS 36

A. OAR 340-041-0033(1) 36
1. Description of Revisions 36
2. EPA Review and Action 36
B. OAR 340-041-0033(2) 37
1. Description of Revisions 37
2. EPA Review and Action 38

VII. PROVISIONS THAT DO NOT REQUIRE ACTION UNDER CWA § 303(C) 38

A. REVISIONS TO NARRATIVE TOXICS PROVISION AT OAR 340-041-0033(3) 38
1. Description of Revisions 38
2. EPA Review 39
B. NEW FOOTNOTES 40
1. Footnote H 40
a) Description of Footnote 40
b) EPA Review 40
2. Footnote J 41
a) Description of Footnote 41
b) EPA Review 41
3. Footnote L 41
a) Description of Footnote 41
b) EPA Review 42
4. Footnote for Asbestos 42
a) Description of Footnote 42
b) EPA Review 42
C. EPA POLLUTANT IDENTIFICATION NUMBERS AND CHEMICAL ABSTRACT SERVICE NUMBERS 42

APPENDIX A

I-A. INTRODUCTION 44

II-A. BACKGROUND 44

A. OREGON'S EVALUATION PROCESS PRIOR TO THE JULY 8, 2004 SUBMITTAL 44
B. OREGON'S SUBSEQUENT REVIEW OF FISH CONSUMPTION RATES TO THE JULY 8, 2004 SUBMITTAL.....45
C. REVIEW OF FISH CONSUMPTION RATE DATA 46
D. CONSUMERS VS. NON-CONSUMERS.....47
E. PACIFIC SALMON IN THE FISH CONSUMPTION RATE 48
F. GEOGRAPHIC EXTENT OF TRIBAL FISHING IN OREGON 49
G. LOCATION OF OTHER HIGH FISH-CONSUMING POPULATIONS IN OREGON.....50

III-A. SUMMARY OF REVIEW OF OREGON'S FISH CONSUMPTION RATE 50

IV-A. ODEQ'S OCTOBER 23, 2008 RECOMMENDATION AND EQC POLICY DECISION ON AN APPROPRIATE FISH CONSUMPTION RATE TO DERIVE HUMAN HEALTH CRITERIA FOR OREGON.....51

V-A. FIGURES 52

FIGURE A-1: MAP OF TRIBES IN OREGON.....53
FIGURE A-2: MAP OF CEDED LANDS OF THE CRITFC TRIBES.....55
FIGURE A-3: MAP OF WATERSHED BOUNDARIES ASSOCIATED WITH CEDED LANDS OF THE CRITFC TRIBES 57
FIGURE A-4: MAP OF FISHING SITES IN THE COLUMBIA RIVER BASIN IDENTIFIED AS PART OF THE CRITFC SURVEY.....59
TABLE A-5: SUMMARY OF LOCAL AND REGIONAL FISH CONSUMPTION SURVEYS AND FISH CONSUMPTION RATE DATA AVAILABLE TO OREGON 60
FIGURE A-6: MAP OF COUNTIES IN OREGON 62

Technical Support Document

for Action on the State of Oregon's New and Revised Human Health Water Quality Criteria for Toxics and Revisions to Narrative Toxics Provisions Submitted on July 8, 2004

I. INTRODUCTION

On July 8, 2004, the Oregon Department of Environmental Quality (ODEQ or the "Department") submitted new and revised water quality standards (WQS)[1] to the U.S. Environmental Protection Agency (EPA or the "Agency") for review and approval. These new and revised WQS were adopted by the Oregon Environmental Quality Commission (OEQC or the "Commission") on May 20, 2004. Oregon's WQS are located in Chapter 340, Division 41, of Oregon's Administrative Rules (OAR 340-041). Part II of this document provides additional background information about Oregon's July 8, 2004, WQS submittal.

Part III of this document provides the basis for EPA's decisions under section (§) 303(c) of the Clean Water Act (CWA) and implementing regulations found in the *Code of Federal Regulations* (CFR) at 40 CFR § 131.11 to approve or disapprove 203 new and revised numeric human health water quality criteria for 105 toxic pollutants included in Oregon's WQS submission. These criteria are established by OAR 340-041-0033(2) and listed in Table 33A of Oregon's revised WQS submitted to EPA on July 8, 2004. They are applicable to Oregon's designated uses of public domestic water supply, private domestic water supply, and fishing. Therefore, EPA's decisions to approve or disapprove these criteria are based on an evaluation of whether the above-described WQS revisions are protective of these designated uses.

Part IV of this document provides EPA's basis for decisions under CWA § 303(c) and 40 CFR §131.11 to approve or disapprove Oregon's addition of four new footnotes (I, K, R, and U) associated with several human health criteria included in the submittal. Part V provides the basis for EPA's decision to approve Oregon's withdrawal of numeric human health criteria for eight toxic pollutants. Part VI provides the basis for EPA's approval of Oregon's revisions to its narrative toxics provisions found at OAR 340-041-0033(1) and (2).

Part VII of this document describes several new and revised provisions included in Oregon's July 8, 2004, submittal which are not considered WQS subject to EPA review and approval

[1] ODEQ. 2004. Letter dated July 8, 2004, with two attachments, from Stephanie Hallock, Administrator, Oregon Department of Environmental Quality, Portland, Oregon, to John Iani, Administrator, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

under § 303(c) of the CWA. For this reason, EPA is taking no action to approve or disapprove these new and revised provisions which include: revisions to Oregon's narrative toxics provision found at OAR 340-041-0033(3); Oregon's addition of three new footnotes (H, J, and L) associated with several human health criteria included in Table 33A; and, Oregon's addition of EPA pollutant identification numbers and Chemical Abstract Service numbers for the chemicals identified in Table 33A of Oregon's July 8, 2004, WQS submittal.

Finally, Appendix A provides a review of Oregon's use of a fish consumption rate of 17.5 grams per day. This review considers information available to ODEQ at the time they adopted these criteria as well as other work conducted by Oregon since 2004.

While Oregon's July 8, 2004, submittal also included new and revised WQS beyond those described above, EPA's decisions under CWA § 303(c) on these additional new and revised WQS have been, or will be, addressed separate from this action.

II. BACKGROUND

A. *Clean Water Act Requirements for Water Quality Standards*

Under § 303(c) of the CWA and federal implementing regulations at 40 CFR § 131.4, states[2] have the primary responsibility for reviewing, establishing, and revising WQS, which consist of the designated uses of a waterbody or waterbody segment and the water quality criteria necessary to protect those designated uses. This statutory framework allows states to work with local communities to adopt appropriate designated uses (as required in 40 CFR § 131.10(a)) and to adopt criteria to protect those designated uses (as required in 40 CFR § 131.11(a)).

CWA § 303(c)(2)(B) requires states to adopt water quality criteria for toxic pollutants listed pursuant to § 307(a)(1) for which EPA has published criteria under § 304(a) where the discharge or presence of these toxics could reasonably be expected to interfere with the designated uses adopted by the state. In adopting such criteria, states must establish numeric values based on one of the following: (1) § 304(a) criteria; (2) § 304(a) criteria modified to reflect site-specific conditions; or, (3) other scientifically defensible methods (40 CFR § 131.11(b)). In addition, states can establish narrative criteria where numeric criteria cannot be determined.

From time to time, states are required to review applicable WQS, and as appropriate, modify and adopt these standards (40 CFR § 131.20). Section 303(c) of the CWA also requires states to submit new or revised WQS to EPA for review. EPA is required to review these changes to ensure revisions in designated water uses are consistent with the CWA and that new or revised criteria protect the designated water uses. In addition, the state must follow its own legal procedures for adopting such standards (40 CFR § 131.5) and submit certification by the state's

[2] Other than when used to refer specifically to the State of Oregon, use of the word "states" or the phrase "a state" throughout this document refers to: The 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and Indian Tribes that EPA determines to be eligible for purposes of WQS program. See definition for "states" provided at 40 CFR § 131.3(j).

attorney general or other appropriate legal authority within the state that the WQS were duly adopted pursuant to state law (40 CFR § 131.6(e)).

B. *Overview of Oregon's July 8, 2004, WQS Submission*

Pursuant to the review requirements established at 40 CFR § 131.20, ODEQ initiated a triennial review of Oregon's WQS in 1999. During its review, ODEQ formed both a technical advisory committee and a policy advisory committee to provide recommendations on revisions to Oregon's WQS. New and revised human health criteria for 105 toxic pollutants were included among the revisions to Oregon's WQS ultimately adopted by the OEQC on May 20, 2004, and submitted to EPA on July 8, 2004.

EPA's action described herein addresses these criteria revisions as well as the addition of seven new footnotes (H, I, J, K, L, R, and U) associated with human health criteria; the withdrawal of previously adopted human health criteria for eight toxic pollutants; revisions to Oregon's narrative toxics provisions found at OAR 340-041-0033(1) through (3); and the addition of EPA pollutant identification numbers and Chemical Abstract Service numbers for the pollutants identified in Table 33A.

ODEQ's submission also included new and revised aquatic life criteria for toxic pollutants, a compliance schedule provision, a rule addressing stratified waters and numerous miscellaneous editorial changes. These later elements are addressed separate from this action.

Prior to the OEQC's May 20, 2004, adoption, ODEQ provided an eighty-eight day formal public comment period on the proposed revisions to the State's WQS described above and held six public hearings in three locations around the State in the cities of Bend, Roseburg, and Portland. The public comment period extended from June 2, 2003, through August 29, 2003, including a four-week extension from the original closing on August 1, 2003. ODEQ received and responded to 51 sets of written comments.[3]

In accordance with 40 CFR § 131.6(e), ODEQ's July 8, 2004, WQS submission also included a letter from Larry Knudsen, Assistant Attorney General at the Oregon Department of Justice, certifying that the new and revised WQS were "lawfully adopted under the applicable provisions of the Oregon Administrative Procedures Act, [Oregon Revised Statutes] ORS 183.310 to 183.725 and the Commission's own procedures for rulemaking in OAR-340-011" (brackets added).

On November 28, 2005 ODEQ submitted an errata letter to EPA containing minor changes to four provisions. The three changes relevant to human health criteria pertain to footnotes and identification numbers that EPA has determined to not be water quality standards under Section 303(c) of the CWA. The fourth modification addresses an aquatic life criterion and thus will be addressed at a separate time.

[3] ODEQ. 2004. *Summary of Public Comments and Agency Responses*. Attachment B to a Memorandum dated April 29, 2004, from Stephanie Hallock, Director, Oregon Department of Environmental Quality, to the Oregon Environmental Quality Commission.

III. NEW AND REVISED HUMAN HEALTH WATER QUALITY CRITERIA

Oregon's human health criteria adopted and approved prior to 2004 were based on EPA's national CWA § 304(a) human health water quality criteria recommendations published in the 1986 *Quality Criteria for Water* (hereinafter referred to as the "Gold Book").[4] These criteria continue to reside in Oregon's WQS rule as Table 20.

One goal of Oregon's 1999-2003 WQS review was to update its human health criteria for toxic pollutants in order to reflect the latest scientific information and EPA's most recent national CWA § 304(a) human health criteria recommendations.[5] In 2000, EPA published a revised methodology for deriving § 304(a) human health criteria recommendations titled *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health* (hereinafter referred to as the "2000 Methodology").[6] In separate updates published in 2002 and 2003,[7,8] EPA updated the § 304(a) human health criteria recommendations to reflect this new methodology and to consider updated toxicological information in EPA's Integrated Risk Information System (IRIS).[9]

Oregon's review of its human health criteria culminated in the OEQC's adoption of 203 new and revised human health criteria for 105 toxic pollutants. These criteria are established by OAR 340-041-0033(2) and are listed in Table 33A of Oregon's revised WQS. Table 33A contains human health criteria for all of the toxic pollutants for which EPA has published criteria recommendations under CWA § 304(a).

Forty-nine of the 105 pollutants for which Oregon adopted new or revised human health criteria are characterized as non-carcinogens (i.e., not having the potential to cause cancer). The remaining 56 pollutants are carcinogens (i.e., having the potential to cause cancer). The calculations that Oregon used to derive the human health criteria for non-carcinogens and carcinogens differ and are further described separately in Sections A and B below.

---

[4] EPA. 1986. *Quality Criteria for Water* ("Gold Book"). U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-86-001. Available at: http://www.epa.gov/waterscience/criteria/library/goldbook.pdf.

[5] ODEQ. 2003. *Toxic Compounds Criteria: 1999-2003 Water Quality Standards Review Issue Paper*. Oregon Department of Environmental Quality, Portland, Oregon. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/may2004/5.20.04.ItemB.AttchH.pdf.

[6] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-822-B-00-004. Available at: http://www.epa.gov/waterscience/criteria/humanhealth/method/complete.pdf

[7] EPA. 2002. *Revision of National Recommended Water Quality Criteria*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 67, Issue: 249, Page: 79091 (67 FR 79091), December 27, 2002. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2002/December/Day-27/w32770.htm.

[8] EPA. 2003. *National Recommended Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 68, Issue: 250, Page: 75507 (68 FR 75507), December 31, 2003. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2003/December/Day-31/w32211.htm.

[9] EPA. Integrated Risk Information System (IRIS). U.S. Environmental Protection Agency, Office of Water, Washington, D.C. Available at: www.epa.gov/iris.

The criteria calculations for non-carcinogens and carcinogens differ depending upon the exposure scenario for which the criteria are derived. Oregon's criteria were adopted to protect human health from chronic (lifetime) exposure to toxic substances through drinking water and eating fish[10] obtained from surface waters. Where the criteria are derived to protect human health from exposure through both drinking water and eating fish (in combination), Oregon has adopted "water + organism" criteria. Where the criteria are derived to protect human health from exposure through eating fish alone (not in combination with drinking water), Oregon has adopted "organism only" criteria. These two sets of criteria (i.e., "water + organism" and "organism only") are reflected in the column headings of Table 33A of Oregon's WQS.

The waterbodies to which each of these sets of criteria apply are determined by the uses that have been designated for the waterbody in OAR 340-041-0101 through OAR 340-041-0340. Waters to be protected for drinking water are those designated as either "Public Domestic Water Supply" or "Private Domestic Water Supply." Waters to be protected for consumption of fish are designated as "Fishing."

Table 1 below identifies those waters in Oregon having both a fishing designated use, as well as a public domestic water supply or a private domestic water supply designated use. Both the "water + organism" criteria and the "organism only" criteria apply to these waters. Table 2 below identifies those waters in Oregon having a fishing designated use but neither a public domestic water supply nor a private domestic water supply designated use. Oregon's "organism only" criteria apply to these waters. EPA has reviewed Oregon's designated use categories and has determined that, if the criteria are shown to protect of the uses, Oregon has appropriately applied the criteria to designated uses such that the criteria will protect human health uses.

Table 1. Waters in Oregon having both a fishing designated use, as well as a public domestic water supply or a private domestic water supply designated use. Both the "water + organism" criteria and the 'organism only' criteria apply to these waters.

OR WQS Table No.	Basin Name	Segment Names
101A	Mainstem Columbia River	Columbia River (Mouth to RM 86); and Columbia River (RM 86 to 309)
121A	Mainstem Snake River	Snake River (RM 176 to 409)
130A	Deschutes Basin	Deschutes River Main Stem from Mouth to Pelton Regulating Dam; Deschutes River Main Stem from Pelton Regulating Dam to Bend Diversion Dam and for the Crooked River Main Stem; Deschutes River Main Stem above Bend Diversion Dam and for the Metolious River Main Steam; and All Other Basin Stems
140A	Goose and Summer Lakes Basin	Freshwater Lakes and Reservoirs; and Freshwater Streams

[10] As used throughout this technical support document, the term "fish" refers to finfish as well as shellfish.

OR WQS Table No.	Basin Name	Segment Names
151A	Grande Ronde Basin	Main Stem Grande Ronde River (RM 39 to 165) and All Other Basin Waters
160A	Hood Basin	Hood River Basin Streams
170A	John Day Basin	John Day River and All Tributaries
180A	Klamath Basin	Klamath River from Klamath Lake to Keno Dam (RM 255 to 232.5); Lost River (RM 5 to 65) and Lost River Diversion Channel; and All Other Basin Waters
190A	Malheur Lake Basin	All Rivers and Tributaries
201 A	Malheur River Basin	Malheur River from Namorf to Mouth; Malheur River from Beulah Dam and Warm Springs Dams to Namorf; Willow Creek from Brogan to Mouth; Willow Creek from Malheur Reservoir to Brogan; Bully Creek from Reservoir to Mouth; Malheur Reservoir, Bully Creek Reservoir, Beulah Reservoir, Warm Springs Reservoir; and Malheur River and Tributaries Upstream from Reservoirs
220A	Mid Coast Basin	Fresh Waters
230A	North Coast Basin	All Other Streams and Tributaries Thereto
250A	Owyhee Basin	Owyhee River (RM 0 to 18); Owyhee River (RM 18 to Dam); Antelope Reservoir, Cow Creek Reservoir, and Owyhee Reservoir; Owyhee River and Tributaries Upstream from Owyhee Reservoir; Main Stem of the South Fork of the Owyhee River from the Oregon-Idaho River border to Three Forks (the confluence of the North, Middle, and South Forks of Owyhee River); and Main Stem Owyhee River from Crooked Creek (RM 22) to the mouth of Birch Creek (RM 76)
260A	Powder/Burnt Basin	All Basin Waters
		Rogue River Main Stem from Estuary to Lost Creek Dam; Rogue River Main Stem above Lost Dam and Tributaries; and All Other Tributaries to Rogue River and Bear Creek
286A	Sandy Basin	Sandy River; and All Other Tributaries to Sandy River
300A	South Coast Basin	All Streams and Tributaries Thereto
310A	Umatilla Basin	Umatilla Sub-basin; Willow Creek Sub-basin; Umpqua River Main Stem from Head of Tidewater to Confluence of North and South Umpqua Rivers; North Umpqua River Main Stem; South Umpqua River Main Stem; and All Other Tributaries to Umpqua, North Umpqua, and South Umpqua Rivers

OR WQS Table No.	Basin Name	Segment Names
330A	Walla Walla Basin	Walla Walla River Main Stem from Confluence of North and South Forks to State Line; and All Other Basin Streams
340A	Willamette Basin	Main Stem Willamette River from Mouth to Willamette Falls, including Multnomah Channel; Main Stem Willamette River from Willamette Falls to Newberg; Main Stem Willamette River from Newberg to Salem; Main Stem Willamette River from Salem to Coast Fork; Clackamas River; Molalla River; Santiam River; McKenzie River; Tualatin River; and All Other Streams and Tributaries

Table 2. Waters in Oregon having a fishing designated use but neither a public domestic water supply nor a private domestic water supply designated use. "Organisms only" criteria apply to these waters.

OR WQS Table No.	Basin	Segment Name
140A	Goose and Summer Lakes Basin	Goose Lake; and Highly Alkaline and Saline Lakes
190A	Malheur Lake Basin	Natural Lakes
220A	Mid Coast Basin	Estuaries and Adjacent Marine Waters
230A	North Coast Basin	Estuaries and Adjacent Marine Waters
271A	Rogue Basin	Rogue River Estuary and Adjacent Marine Waters; and Bear Creek Main Stem
286A	Sandy Basin	Streams Forming Waterfalls Near Columbia River Highway
300A	South Coast Basin	Estuaries and Adjacent Marine Waters
320A	Umpqua Basin	Umpqua River Estuary to Head of Tidewater and Adjacent Marine Waters

A. *New and Revised Human Health Criteria for Non-Carcinogens*

Oregon adopted new and revised human health criteria for 49 non-carcinogens. The criteria for 47 of these pollutants were derived using EPA's 2000 Methodology. EPA's action on these criteria is discussed in subsection 1 below and the criteria are listed in Table 3 below. Oregon's new human health criteria for methylmercury and copper were derived using an alternate approach recommended by EPA. EPA's action on these criteria is discussed in subsections 2 and 3 below.

1. "Water + Organism" and "Organism Only" Criteria Identified in Table 3

a) Criteria Derivation

EPA's 2000 Methodology provides guidance for deriving human health criteria for toxic pollutants. Pursuant to Section 304(a) of the CWA, EPA has published a table of recommended criteria for use by states in adopting and revising criteria.[11] For human health criteria, the values in this table reflect the 'national default' values provided in the 2000 Methodology, the RfD contained in the Integrated Risk Information System (IRIS) at the time of publication, the use of BCFs as opposed to site-specific BAFs and a cancer risk level of 10^{-6}. While the 2000 Methodology provides national default values, it also provides necessary guidance to adjust criteria to reflect local conditions and encourages states to use the guidance to appropriately reflect local conditions and/or protect identifiable subpopulations.[12]

Criteria calculated pursuant to the 2000 Methodology are based on applying a number of pollutant-specific and general risk-assessment values into an equation that generates a criteria protective of human health uses. Oregon applied this equation in deriving their "water + organism" and "organism only" human health criteria. A simplified version of this equation is provided in Figure 1 below, followed by a discussion of the variables in these equation and the values utilized by Oregon.

Figure 1. Simplified version of the equation used by Oregon in deriving the human health criteria identified in Table 3 below for non-carcinogens.

$$AWQC = RfD \bullet RSC \bullet \frac{(BW)}{[DI + (FCR \bullet BAF)]}$$

where:

AWQC	=	Ambient Water Quality Criterion (milligrams per liter)
RfD	=	Reference dose for noncancer effects (milligrams per kilogram per day)
RSC	=	Relative source contribution factor to account for non-water sources of exposure (unitless)
BW	=	Human body weight (kilograms)
DI	=	Drinking water intake (liters per day)
FCR	=	Fish Consumption Rate (kilograms per day)
BAF	=	Bioaccumulation factor (liters per kilogram)

[11] EPA National Recommend Ambient Water Quality Criteria for the Protection of Aquatic Life and Human Health. Published pursuant to section 304(a) of the Clean Water Act. Available at: http://www.epa.gov/waterscience/criteria/wqctable/index.html.

[12] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Pages iii, 1-11.

For non-carcinogens, EPA's 2000 Methodology recommends deriving human health criteria using a reference dose. A reference dose is defined as "an estimate (with uncertainty spanning approximately an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects over a lifetime."[13] In other words, individuals should not suffer from appreciable risks of deleterious effects if their exposure to a chemical is at or below the reference dose for that chemical. Thus, the reference dose serves as a threshold level and is specific to each individual pollutant. In deriving both the "water + organism" and "organism only" criteria, Oregon utilized the reference doses recommended by EPA for § 304(a) criteria. [14,15]

The relative source contribution identifies the percent of total exposure attributed to the sources under consideration (i.e., water and fish for "water + organism" criteria, and fish for "organism only" criteria). When applied with the reference dose, these factors provide an estimate of daily exposure safely allowed under the criteria.[16] Oregon utilized the relative source contributions recommended by EPA for § 304(a) criteria.[14, 15]

Oregon used EPA's national default values for body weight (70 kilograms), drinking water intake rate (two liters per day) and fish consumption rate (17.5 grams per day).

A default body weight value of 70 kilograms was recommended by EPA as this is the body weight used in cancer slope factor calculations within the IRIS database. This provides for consistency between the dose-response relationship and exposure factors utilized in criteria calculations. Several studies and recommendations support this value. The third *National Health and Nutrition Examination Survey* (NHANES) was conducted between 1988 and 1994 on a nationwide probability sample of over 30,000 persons. The mean body weight value for men and women ages 18-74 years old from this survey was 75.6 kilograms. A survey by the National Cancer Institute measured a mean body weigh value of 70.5 kilograms for adults aged 20-64 years old. Based on an earlier NHANES survey, EPA's *Exposure Factors Handbook* recommends using a body weight of 71.8 kilograms for adults.[17]

A fish consumption rate of 17.5 grams per day represents the 90th percentile of freshwater and estuarine finfish and shellfish consumption data collected from the 1994-1996 *Continuing Survey*

---

[13] EPA. 1993. *Reference Dose (RfD): Description and Use in Health Risk Assessments.* Integrated Risk Information System (IRIS). Intra-Agency Reference Dose (RfD) Work Group, Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, U.S. Environmental Protection Agency, Cincinnati, OH. Available at: http://www.epa.gov/ncea/iris/rfd.htm.

[14] See: EPA. 2002. *Nationally Recommended Water Quality Criteria 2002 – Human Health Criteria Calculation Matrix*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-R-02-012. Available at: http://www.epa.gov/waterscience/criteria/wqctable/hh_calc_matrix.pdf.

[15] See: EPA. 2003. *National Recommended Water Quality Criteria for the Protection of Human Health.* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 68, Issue: 250, Page: 75507 (68 FR 75507), December 31, 2003. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2003/December/Day-31/w32211.htm.

[16] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Page 4-5.

[17] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Pages 4-18 to 4-19.

of Food Intake by Individuals (hereinafter referred to as the "CSFII survey") conducted by the U.S. Department of Agriculture and represents all US citizens, including those surveyed who do not consume fish or shellfish. EPA utilizes a fish consumption rate of 17.5 grams per day in deriving its national CWA § 304(a) human health criteria recommendations. This national default value is recommended to protect the general U.S. adult population. EPA's 2000 Methodology recognizes the variability of fish consumption rates among population groups and by geographic region, and emphasizes that states should use local or regional data over EPA's national default value when such data is available.[18]

The CSFII survey also serves as the basis for the drinking water intake rate of two liters per day. This rate represents the 86th percentile of drinking water intake data for adults collected from the CSFII survey.[19] While this rate was utilized for "water + organisms" criteria, a drinking water intake rate of zero liters per day was used for "organism only" criteria because drinking water is not a designated use protected by these criteria.

The bioaccumulation factor (BAF) describes the uptake and retention of a pollutant by an aquatic organism from all sources (e.g., water, ingestion, and sediment). The magnitude of bioaccumulation by aquatic organisms varies widely depending upon the pollutant but can be extremely high for some highly persistent and hydrophobic pollutants. For such highly bioaccumulative pollutants, concentrations in aquatic organisms may pose unacceptable human health risks from fish consumption if not accounted for in the criteria.

Development of bioaccumulation factors is a time and resource intensive process and varies from site-to-site. Therefore, very few BAFs have been developed, none of which are applicable on a national scale. Until such time as local or regional BAFs are available, EPA recommends criteria be developed using bioconcentration factors (BCF), reflecting the uptake and retention of a pollutant by an aquatic organism from water alone. Oregon utilized the EPA recommended bioconcentration factors in deriving their criteria.[14, 15]

Table 3. Oregon's July 8, 2004 submission of new and revised "water + organism" and "organism only" human health criteria for 47 non-carcinogens.

Chemical Name	"Water + Organism" Criteria (micrograms per liter (µg/L))	"Organism Only" Criteria (µg/L)
Acenaphthene	670	990
Acrolein	190	290
Anthracene	8300	40000
Antimony	5.6	640
BHC gamma- (Lindane)	0.98	1.8
Butylbenzyl Phthalate	1500	1900
Chlorobenzene	130	1600
ChloroisopropylEther Bis2-	1400	65000
Chloronapthalene 2-	1000	1600

[18] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Page 4-24 to 4-25.
[19] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Pages 4-21 to 4-22.

Chemical Name	"Water + Organism" Criteria (micrograms per liter (µg/L))	"Organism Only" Criteria (µg/L)
Chlorophenol 2-	81	150
Cyanide	140	140
Dichlorobenzene 1,2-	420	1300
Dichlorobenzene 1,3-	320	960
Dichlorobenzene 1,4-	63	190
Dichloroethylene 1,1-	330	7100
Dichlorophenol 2,4-	77	290
DiethylPhthalate	17000	44000
Dimethylphenol 2,4-	380	850
DimethylPhthalate	270000	1100000
Di-n-Butyl Phthalate	2000	4500
Dinitrophenol 2,4-	69	5300
Dinitrophenols	69	5300
Endosulfan	62	89
Endosulfan alpha-	62	89
Endosulfan beta-	62	89
Endosulfan sulfate	62	89
Endrin	0.059	0.06
Endrin Aldehyde	0.29	0.3
Ethylbenzene	530	2100
Fluoranthene	130	140
Fluorene	1100	5300
Hexachlorocyclopentadiene	40	1100
Methyl Bromide	47	1500
Methyl-4,6-Dinitrophenol 2-	13	280
Nickel	610	4600
Nitrobenzene	17	690
Pentachlorobenzene	1.4	1.5
Phenol	21000	1700000
Pyrene	830	4000
Selenium	170	4200
Tetrachlorobenzene 1,2,4,5	0.97	1.1
Thallium	0.24	0.47
Toluene	1300	15000
Trans-Dichloroethylene 1,2	140	10000
Trichlorobenzene 1,2,4-	35	70
Trichlorophenol 2,4,5	1800	3600
Zinc	7400	26000

b) EPA Review and Action

(1) Review of Values Used to Calculate Criteria

EPA's 2000 Human Health Methodology provides guidance for deriving human health criteria for toxic pollutants. For each variable used in the criteria calculation, EPA provides a "national default value" and guidance on specific adjustments that may be necessary to reflect local conditions and/or protect identifiable subpopulations. As part of evaluating whether Oregon's criteria protect the designated uses, EPA looked at the input values used by Oregon and whether there was Oregon-specific information relative to each value that should be considered in the review.

For all input variables, Oregon used EPA's recommended national default values for calculating their 2004 human health criteria. EPA has not identified any local or regional data to indicate that the national values for the reference dose, relative source contribution, body weight, drinking water intake rate, or bioaccumulation factors are inappropriate for use in Oregon.[20]

EPA's initial review of local and regional fish consumption data indicated that such data was available and should be considered consistent with EPA's 2000 Methodology. The Methodology recognizes the variability of fish consumption rates among population groups and by geographic region. In employing the 2000 Methodology to derive criteria, the Agency urges States and Tribes to use a fish intake level derived from local or regional data instead of the national default recommendation to ensure the fish intake level chosen is protective of highly exposed individuals in the population and to ensure that adequate protection is afforded to all identifiable subpopulations. A four preference hierarchy concerning the use of fish consumption rate data is set forth: (1) use of local data; (2) use of data reflecting similar geography/population groups; (3) use of data from national surveys; and (4) use of EPA's default intake rate. In using local data, EPA recommends that arithmetic mean values should be the lowest value considered by states when choosing fish consumption rates for use in criteria derivation.[21]

In 1996, Oregon initiated an extensive review of the use of a fish consumption rate of 17.5 grams per day for deriving human health criteria protective of the people of Oregon. As part of this, a group of regional experts were asked to provide their evaluation of local and regional fish consumption studies and provide their recommendations to ODEQ. As a result of this review, ODEQ recommended to their governing body, the Oregon Environmental Quality Commission (OEQC), that Oregon's human health criteria be revised based on a fish consumption rate of 175 grams per day. On October 23, 2008 the Commission directed ODEQ to revise the Oregon Water Quality Standards to reflect that higher fish consumption rate.

---

[20] On June 10, 2009, subsequent to Oregon's July 8, 2004, submittal, EPA updated its national CWA § 304(a) human health criteria recommendations for acrolein and phenol. These updated values incorporate new reference doses for acrolein and phenol.

[21] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health.* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Pages 1-9 to 1-13, 4-24 to 4-25.

(2) Evaluation of Level of Protection Provided by Criteria

EPA's WQS regulations require that criteria protect the designated uses. As noted previously, Oregon's human health criteria apply to waters with fishing and water supply uses and thus must be established at a level that will protect those uses. Therefore, EPA must evaluate whether the criteria protect the use.
For non-carcinogens, EPA evaluated whether criteria are established at a level that results in exposure at or below the known reference dose (RfD) for a pollutant. EPA defines a reference dose as "an estimate (with uncertainty spanning approximately an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects over a lifetime".[22] The exact nature or magnitude of risk to those with exposures above the reference dose is difficult to quantify, and reference doses are not provided as a range but as a threshold level. EPA's IRIS database contains current RfDs for all pollutants for which EPA has 304(a) human health criteria recommendations.

In order to determine if fish consumption at levels higher than those used to calculate Oregon's 2004 criteria could result in exposure above the RfD, EPA calculated a hazard quotient, a ratio between the potential exposure to a substance and the level at which no adverse effects are expected.[23] If the hazard quotient is less than or equal to 1.0, the RfD would not be exceeded and the criterion would be protective. However, if the hazard quotient is greater than 1.0, the RfD is exceeded.

In order to evaluate whether Oregon's new and revised human health criteria for non-carcinogens would protect designated uses in Oregon, EPA calculated the hazard quotients associated with each criterion and an exposure resulting from a fish consumption rate of 17.5, 63, 113, 176, and 389 grams per day. A fish consumption rate of 17.5 grams per day reflects that used by Oregon to derive their 2004 criteria. As discussed in Appendix A, the additional fish consumption rates are representative of levels documented in the 1994 Columbia River Inter-Tribal Fish Commission Fish Consumption Survey ("CRITFC study"), that shows that tribal members are eating fish at rates much higher than 17.5 grams per day. Furthermore, the OEQC directed ODEQ to revise their human health criteria based on a fish consumption rate of 175 grams per day (see Appendix A).[24] The OEQC's 2008 directive represents the latest policy direction provided to ODEQ on this issue and thus the latest information available to EPA concerning Oregon's position relative to the appropriate fish consumption rate necessary to develop toxics criteria that protect Oregon's human health uses. Thus, Oregon has effectively determined that the fish consumption rate used in the 2004 criteria adoption was not sufficiently representative of Oregon's population. EPA has evaluated the hazard quotients for these higher levels of fish consumption to more accurately represent Oregon's population. These calculations

---

[22] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health.* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Page 3-17.
[23] EPA. 2002. National Scale Air Toxics Assessment Program Glossary. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. Available at: http://www.epa.gov/ttn/atw/nata2002/gloss1.html.
[24] The OEQC is the executive body within the State of Oregon charged with establishing the environmental policies by which the waters of the state will be protected, maintained, and improved "for public water supplies, for the propagation of wildlife, fish and aquatic life and for domestic, agricultural, industrial, municipal, recreational and other legitimate beneficial uses." Or. Rev. Stat. § 468B.015, *see also* Or. Rev. Stat. § 468.015.

are shown in Tables 5 and 6 below.

The results of this evaluation indicate that a hazard quotient of 1.0 is associated with a fish consumption rate of 17.5 grams per day and represents the level of exposure to a chemical that would not exceed the RfD. Therefore, Oregon's new and revised human health criteria for the 47 non-carcinogens identified in Table 3 above are protective of the health of those populations in Oregon consuming up to 17.5 grams of fish per day.

However**,** this evaluation also indicates that, for the four higher fish consumption rate values discussed above, all hazard quotients exceed 1.0, thereby representing a level of exposure that exceeds the RfD. EPA has determined that Oregon's new and revised "water + organism" and "organism only" human health criteria for the 47 non-carcinogens identified in Table 3 above are not protective of waters in Oregon having a fishing designated use, consistent with the OEQC's 2008 directive. This determination is based upon the following analysis. A fish consumption rate of 17.5 grams per day is not sufficiently representative of the fish consumption levels among Oregon's population as determined in the OEQC directive discussed above and in Appendix A. Because the calculations of hazard quotients in Table 8 exceed 1.0 at the higher fish consumption rates documented in the CRITFC study, the criteria do not assure that Oregon's fishing designated use is protected consistent with OEQC's directive to revise Oregon's human health criteria based on a fish consumption rate of 175 grams per day.

EPA finds that Oregon's new and revised human health criteria for the 47 non-carcinogens identified in Table 3 above are not protective of Oregon's fishing designated use, consistent with the OEQC's 2008 directive, and therefore these criteria are inconsistent with the federal requirements at 40 CFR § 131.11(a)(1).

(3) Disapproval

Based upon the above evaluation and in accordance with its CWA authority, 33 U.S.C. § 1313(c)(3) and 40 CFR Part 131, EPA disapproves Oregon's new and revised "water + organism" and "organism only" human health criteria for the 47 non-carcinogens identified in Table 3 above which are included in Table 33A of Oregon's WQS.

Table 5. Hazard quotients associated with Oregon's new and revised "water +organism" human health criteria identified in Table 3 above for populations consuming fish at rates of 17.5, 63, 113, 176, and 389 grams per day (g/day).

Chemical Name	Oregon's 2004 "Water + Organism" Criterion (µg/L)	Hazard Quotients Associated with Oregon's New and Revised Criteria for a Population Consuming Fish at the Following Fish Consumption Rates				
		17.5 g/day	63 g/day	113 g/day	176 g/day	389 g/day
Acenaphthene	670	1.00	2.77	4.71	7.11	15.42
Acrolein	190	1.00	2.71	4.56	6.88	14.86
Anthracene	8300	1.00	1.54	2.13	2.87	5.41
Antimony	5.6	1.00	1.02	1.05	1.08	1.18

Chemical Name	Oregon's 2004 "Water + Organism" Criterion (µg/L)	Hazard Quotients Associated with Oregon's New and Revised Criteria for a Population Consuming Fish at the Following Fish Consumption Rates				
		17.5 g/day	63 g/day	113 g/day	176 g/day	389 g/day
BHC gamma- (Lindane)	0.98	1.00	2.39	3.90	5.79	12.30
Butylbenzyl Phthalate	1500	1.00	3.05	5.28	8.05	17.64
Chlorobenzene	130	1.00	1.22	1.45	1.74	2.76
ChloroisopropylEther Bis2-	1400	1.00	1.06	1.12	1.19	1.45
Chloronapthalene 2-	1000	1.00	2.67	4.49	6.75	14.56
Chlorophenol 2-	81	1.00	2.41	3.95	5.86	12.46
Cyanide	140	1.00	1.02	1.05	1.08	1.18
Dichlorobenzene 1,2-	420	1.00	1.85	2.79	3.95	7.95
Dichlorobenzene 1,3-	320	1.00	1.85	2.79	3.95	7.95
Dichlorobenzene 1,4-	63	1.00	1.85	2.79	3.95	7.95
Dichloroethylene 1,1-	330	1.00	1.12	1.25	1.42	1.99
Dichlorophenol 2,4-	77	1.00	1.69	2.43	3.36	6.57
DiethylPhthalate	17000	1.00	2.02	3.13	4.51	9.27
Dimethylphenol 2,4-	380	1.00	2.18	3.46	5.06	10.57
DimethylPhthalate	270000	1.00	1.63	2.31	3.16	6.09
Di-n-Butyl Phthalate	2000	1.00	2.14	3.39	4.94	10.29
Dinitrophenol 2,4-	69	1.00	1.03	1.07	1.12	1.28
Dinitrophenols	69	1.00	1.03	1.07	1.12	1.28
Endosulfan	62	1.00	2.83	4.83	7.32	15.92
Endosulfan alpha-	62	1.00	2.83	4.83	7.32	15.92
Endosulfan beta-	62	1.00	2.83	4.83	7.32	15.92
Endosulfan sulfate	62	1.00	2.83	4.83	7.32	15.92
Endrin	0.059	1.00	3.45	6.30	9.75	21.63
Endrin Aldehyde	0.29	1.00	3.45	6.30	9.75	21.63
Ethylbenzene	530	1.00	1.65	2.35	3.22	6.24
Fluoranthene	130	1.00	3.38	5.96	9.19	20.31
Fluorene	1100	1.00	1.54	2.13	2.87	5.41
Hexachlorocyclopentadiene	40	1.00	1.10	1.20	1.33	1.78
Methyl Bromide	47	1.00	1.08	1.17	1.29	1.67
Methyl-4,6-Dinitrophenol 2-	13	1.00	1.12	1.25	1.41	1.97
Nickel	610	1.00	1.76	2.59	3.62	7.19
Nitrobenzene	17	1.00	1.06	1.13	1.22	1.52
Pentachlorobenzene	1.4	1.00	3.48	6.18	9.54	21.15
Phenol	21000	1.00	1.03	1.07	1.11	1.26
Pyrene	830	1.00	1.54	2.13	2.87	5.41
Selenium	170	1.00	1.11	1.22	1.36	1.86
Tetrachlorobenzene 1,2,4,5	0.97	1.00	3.37	5.95	9.17	20.27
Thallium	0.24	1.00	2.32	3.75	5.53	11.69
Toluene	1300	1.00	1.22	1.47	1.77	2.82
Trans-Dichloroethylene 1,2	140	1.00	1.04	1.07	1.12	1.29
Trichlorobenzene 1,2,4-	35	1.00	2.30	3.73	5.49	11.60
Trichlorophenol 2,4,5	1800	1.00	2.28	3.68	5.41	11.41
Zinc	7400	1.00	1.76	2.59	3.62	7.19

Table 6. Hazard quotients associated with Oregon's new and revised "organism only" human health criteria identified in Table 3 above for populations consuming fish at rates of 17.5, 63, 113, 176, and 389 grams per day.

Chemical Name	Oregon's 2004 "Organism Only" Criterion (µg/L)	Hazard Quotients Associated with Oregon's New and Revised Criteria for a Population Consuming Fish at the Following Fish Consumption Rates				
		17.5 g/day	63 g/day	113 g/day	176 g/day	389 g/day
Acenaphthene	990	1.00	3.61	6.46	10.00	22.23
Acrolein	290	1.00	3.61	6.46	10.00	22.23
Anthracene	40000	1.00	3.61	6.46	10.00	22.23
Antimony	640	1.00	3.61	6.46	10.00	22.23
BHC gamma- (Lindane)	1.8	1.00	3.61	6.46	10.00	22.23
Butylbenzyl Phthalate	1900	1.00	3.61	6.46	10.00	22.23
Chlorobenzene	1600	1.00	3.61	6.46	10.00	22.23
ChloroisopropylEther Bis2-	65000	1.00	3.61	6.46	10.00	22.23
Chloronapthalene 2-	1600	1.00	3.61	6.46	10.00	22.23
Chlorophenol 2-	150	1.00	3.61	6.46	10.00	22.23
Cyanide	140	1.00	3.61	6.46	10.00	22.23
Dichlorobenzene 1,2-	1300	1.00	3.61	6.46	10.00	22.23
Dichlorobenzene 1,3-	960	1.00	3.61	6.46	10.00	22.23
Dichlorobenzene 1,4-	190	1.00	3.61	6.46	10.00	22.23
Dichloroethylene 1,1-	7100	1.00	3.61	6.46	10.00	22.23
Dichlorophenol 2,4-	290	1.00	3.61	6.46	10.00	22.23
DiethylPhthalate	44000	1.00	3.61	6.46	10.00	22.23
Dimethylphenol 2,4-	850	1.00	3.61	6.46	10.00	22.23
DimethylPhthalate	1100000	1.00	3.61	6.46	10.00	22.23
Di-n-Butyl Phthalate	4500	1.00	3.61	6.46	10.00	22.23
Dinitrophenol 2,4-	5300	1.00	3.61	6.46	10.00	22.23
Dinitrophenols	5300	1.00	3.61	6.46	10.00	22.23
Endosulfan	89	1.00	3.61	6.46	10.00	22.23
Endosulfan alpha-	89	1.00	3.61	6.46	10.00	22.23
Endosulfan beta-	89	1.00	3.61	6.46	10.00	22.23
Endosulfan sulfate	89	1.00	3.61	6.46	10.00	22.23
Endrin	0.06	1.00	3.61	6.46	10.00	22.23
Endrin Aldehyde	0.3	1.00	3.61	6.46	10.00	22.23
Ethylbenzene	2100	1.00	3.61	6.46	10.00	22.23
Fluoranthene	140	1.00	3.61	6.46	10.00	22.23
Fluorene	5300	1.00	3.61	6.46	10.00	22.23
Hexachlorocyclopentadiene	1100	1.00	3.61	6.46	10.00	22.23
Methyl Bromide	1500	1.00	3.61	6.46	10.00	22.23
Methyl-4,6-Dinitrophenol 2-	280	1.00	3.61	6.46	10.00	22.23
Nickel	4600	1.00	3.61	6.46	10.00	22.23
Nitrobenzene	690	1.00	3.61	6.46	10.00	22.23
Pentachlorobenzene	1.5	1.00	3.61	6.46	10.00	22.23
Phenol	1700000	1.00	3.61	6.46	10.00	22.23
Pyrene	4000	1.00	3.61	6.46	10.00	22.23

Chemical Name	Oregon's 2004 "Organism Only" Criterion (µg/L)	Hazard Quotients Associated with Oregon's New and Revised Criteria for a Population Consuming Fish at the Following Fish Consumption Rates				
		17.5 g/day	63 g/day	113 g/day	176 g/day	389 g/day
Selenium	4200	1.00	3.61	6.46	10.00	22.23
Tetrachlorobenzene 1,2,4,5	1.1	1.00	3.61	6.46	10.00	22.23
Thallium	0.47	1.00	3.61	6.46	10.00	22.23
Toluene	15000	1.00	3.61	6.46	10.00	22.23
Trans-Dichloroethylene 1,2	10000	1.00	3.61	6.46	10.00	22.23
Trichlorobenzene 1,2,4-	70	1.00	3.61	6.46	10.00	22.23
Trichlorophenol 2,4,5	3600	1.00	3.61	6.46	10.00	22.23
Zinc	26000	1.00	3.61	6.46	10.00	22.23

2. Methylmercury

a) Criterion Derivation

On January 8, 2001, EPA published [25] a new national CWA § 304(a) human health criterion recommendation for methylmercury [26] which replaced EPA's previous recommendations for total mercury. The new recommendation is expressed as a fish tissue value, thus reflecting the latest science that indicates consumption of contaminated fish and shellfish is the primary human route of exposure to methylmercury. Similar to the 2000 Methodology, the computation of the methylmercury criterion involves uses of several input variables. In the 2001 criteria document, EPA strongly encourages States and authorized Tribes to consider developing a criterion using local or regional data over the default values if they believe that they would be more appropriate for their target population. These adjustments should be applied consistent with the guidance provided in the 2000 Human Health Methodology.[27]

Consistent with EPA's recommendation, Oregon replaced its "water + organism" and "organism only" water column human health criteria for total mercury with a new fish tissue-based "organism only" human health criterion for methylmercury equal to 300 micrograms per kilogram (see Table 7 below). In deriving this new criterion, Oregon used the equation in Figure 8 below and following values for each variable: reference dose equal to 0.0001 milligrams per kilogram per day; relative source contribution equal to 0.000027 milligrams per kilogram per day; body weight equal to 70 kilograms; and, fish consumption rate equal to 17.5 grams per day.

[25] EPA. 2001. *Water Quality Criteria: Notice of Availability of Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 66, Issue: 5, Page: 1344 (66 FR 1344), January 8, 2001. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2001/January/Day-08/w217.htm.

[26] EPA. 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001. Available at: http://www.epa.gov/waterscience/criteria/methylmercury/document.html.

[27] EPA. 2001. *Water Quality Criterion for the Protection of Human Health: Methylmercury*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 823-R-01-001, page 7-2.

Table 7. Oregon's new fish tissue-based "organism only" human health criterion for methylmercury as submitted by Oregon on July 8, 2004.

Chemical Name	"Water + Organism" Criterion	"Organism Only" Criterion (in micrograms per kilogram (µg/kg))
Methylmercury	n/a	300

Figure 8. Simplified version of the equation used by Oregon in deriving its new fish tissue-based "organism only" human health criterion for methylmercury.

$$TRC = \frac{(RfD - RSC) \bullet (BW)}{(FCR)}$$

where:

TRC	=	Fish Tissue Residue Criterion (milligrams per kilogram)
RfD	=	Reference dose for noncancer effects (milligrams per kilogram per day)
RSC	=	Relative source contribution factor to account for non-water sources of exposure (milligrams per kilogram per day)
BW	=	Human body weight (kilograms)
FCR	=	Fish Consumption Rate (kg/day)

b) EPA Review and Action

(1) Review of Values Used to Calculate Criterion

As part of evaluating whether Oregon's criteria protect the designated uses, EPA looked at the input values used by Oregon and whether there was Oregon-specific information relative to each value that should be considered in the review.

In calculating their new methylmercury criteria, Oregon used EPA's recommended national default values for all input variables. EPA has not identified any local or regional data to indicate that the national values for the reference dose, relative source contribution and body weight are inappropriate for use in Oregon.[28] As discussed in the previous section addressing the criteria for non-carcinogenic pollutants listed in Table 3, EPA's review of local and regional fish consumption data indicated that such data was available and should be considered. Further discussion on this variable is included in that section and Appendix A.

[28] On June 10, 2009, subsequent to Oregon's July 8, 2004, submittal, EPA updated its national CWA § 304(a) human health criteria recommendations for acrolein and phenol. These updated values incorporate new reference doses for acrolein and phenol.

(2) Evaluation of Level of Protection Provided by Criterion

EPA's WQS regulations require that criteria protect the designated uses. As noted previously, Oregon's human health criteria apply to waters with fishing and water supply uses and thus must be established at a level that will protect those uses. Therefore, EPA must evaluate whether the criteria protect the use.

In evaluating the protectiveness of Oregon's new fish tissue-based "organism only" human health criterion for methylmercury, EPA relied on the same rationale and supporting information used to evaluate Oregon's new and revised human health criteria for the 47 non-carcinogens identified in Table 3 above.

In order to evaluate whether Oregon's new human health criterion for methylmercury would protect designated uses in Oregon, EPA calculated the hazard quotients (Table 8 below) associated with the criterion and an exposure resulting from a fish consumption rate of 17.5, 63, 113, 176, and 389 grams per day. A fish consumption rate of 17.5 grams per day reflects that used by Oregon to derive their 2004 criteria. As discussed in Appendix A, the additional fish consumption rates are representative of levels documented in the 1994 Columbia River Inter-Tribal Fish Commission Fish Consumption Survey that shows that tribal members are eating fish at rates much higher than 17.5 grams per day. Furthermore, the OEQC directed ODEQ to revise their human health criteria based on a fish consumption rate of 175 grams per day (see Appendix A). The OEQC's 2008 directive represents the latest policy direction provided to ODEQ on this issue and thus the latest information available to EPA concerning Oregon's position relative to the appropriate fish consumption rate necessary to develop toxics criteria that protect Oregon's human health uses. Thus, Oregon has effectively determined that the fish consumption rate used in the 2004 criteria adoption was not sufficiently representative of Oregon's population. Thus, EPA has evaluated the hazard quotients for these higher levels of fish consumption to more accurately represent Oregon's population. These calculations are shown in Table 8 below.

The results of this evaluation indicate that a hazard quotient of 1.0 is associated with a fish consumption rate of 17.5 grams per day and represents the level of exposure to a chemical that would not exceed the RfD. Therefore, Oregon's new methylmercury criterion identified in Table 7 above is protective of the health of those populations in Oregon consuming up to 17.5 grams of fish per day.

However**,** this evaluation also indicates that, for the four higher fish consumption rate values discussed above, the hazard quotients exceed 1.0, thereby representing a level of exposure that exceeds the RfD. EPA has determined that Oregon's new "organism only" human health criterion for methylmercury identified in Table 7 above is not protective of waters in Oregon having a fishing designated use, consistent with the OEQC's 2008 directive. This determination is based upon the following analysis. A fish consumption rate of 17.5 grams per day is not sufficiently representative of the fish consumption levels among Oregon's population as determined in the OEQC directive discussed above and in Appendix A. Because the calculations of hazard quotients in Table 8 exceed 1.0 at the higher fish consumption rates documented in the CRITFC study, the criteria do not assure that Oregon's fishing designated use is protected

consistent with OEQC's directive to revise Oregon's human health criteria based on a fish consumption rate of 175 grams per day.

EPA finds that Oregon's new human health criterion for methylmercury in Table 7 above is not protective of Oregon's fishing designated use, consistent with the OEQC's 2008 directive, and therefore this criterion is inconsistent with the federal requirements at 40 CFR § 131.11(a)(1).

(3) Disapproval

Based on the above evaluation and in accordance with its CWA authority, 33 U.S.C. § 1313(c)(3) and 40 CFR Part 131, EPA disapproves Oregon's new fish tissue-based "organism only" human health criterion for methylmercury identified in Table 7 above and Table 33A of Oregon's WQS.

Table 8. Hazard quotients associated with Oregon's new fish tissue-based "organism only" human health criterion for methylmercury for populations consuming fish at rates of 17.5, 63, 113, 176, and 389 grams per day.

Chemical Name	"Organism Only" Criterion (µg/kg)	Hazard Quotients Associated with Oregon's New or Revised Criteria for a Population Consuming Fish at the Following Fish Consumption Rates:				
		17.5 g/day	63 g/day	113 g/day	176 g/day	389 g/day
Methylmercury	300	1.00	3.61	6.46	10.00	22.23

3. Copper

a) Criterion Derivation

Consistent with EPA's 304(a) recommendation, Oregon adopted a new human health criterion of 1300 micrograms per liter for copper (see Table 9 below). Since the human health risks from copper are primarily from drinking water, no "organism only" criterion was adopted. The 'water + organism" criterion was established at the level of EPA's drinking water criterion under the Safe Drinking Water Act (SDWA).

Table 9. Oregon's July 8, 2004 submission of new human health criterion for copper.

Chemical Name	"Water + Organism" Criterion (µg/L)	"Organism Only" Criterion
Copper	1300	n/a

b) EPA Review and Action

(1) Protectiveness Evaluation

Fish consumption is not an exposure pathway used in the derivation of EPA's national criterion

recommendation and therefore fish consumption rates are not relevant to evaluation of the protectiveness of the criterion. Oregon's copper criterion applies to all waters in Oregon designated for either public domestic water supply or private domestic water supply, irrespective of whether a fishing use has been designated.[29] As such, the criterion appropriately applies to waters identified in Table 1 above, as well as the Bull Run River and its tributaries in the Sandy Basin.

Oregon's new human health water quality criterion for copper is consistent with EPA's current 304(a) criterion recommendation and is the same as the drinking water criterion established under the SDWA. EPA has not found any local or regional data indicating this value to be inappropriate for Oregon.

Based on this information, EPA finds that Oregon's human health criterion for copper is protective of Oregon's public domestic water supply and private domestic water supply designated uses. Therefore, it is consistent with the federal requirements at 40 CFR §131.11(a)(1).

(2) Approval

Based upon the above evaluation and in accordance with its CWA authority, 33 *U.S.C.* §1313(c)(3) and 40 CFR Part 131, EPA approves Oregon's new human health criterion for copper identified in Table 9 above and Table 33A of Oregon's WQS.

B. *New and Revised Human Health Criteria for Carcinogens*

Oregon adopted new and revised human health criteria for 56 carcinogens. The criteria for 55 of these pollutants were derived using EPA's 2000 Methodology. EPA's action on these criteria is discussed in subsection 1 below and the criteria listed in Table 10 below. Oregon's new human health criterion for asbestos was derived using an alternate approach and is discussed in subsection 2 below.

1. "Water + Organism" and "Organism Only" Criteria Identified in Table 10

a) Criteria Derivation

EPA's 2000 Methodology describes procedures that can be used as guidance by states for deriving human health water criteria. The 2000 Methodology includes an equation that was used by Oregon in deriving the "water + organism" and "organism only" human health criteria for the 55 carcinogens identified in Table 10 below which are included in Table 33A of Oregon's WQS submitted to EPA on July 8, 2004. A simplified version of this equation is provided in Figure 9 below. Descriptions of the variables included in these equations, and the values that Oregon

[29] ODEQ. 2009. Email communication dated June 9, 2009, from Debra Sturdevant, WQS Program Lead, Oregon Department of Environmental Quality to Melinda McCoy, WQS Coordinator, EPA.

utilized for each variable, are also provided below.

Figure 9. Simplified version of the equation used by Oregon in deriving the human health criteria identified in Table 10 below for carcinogens.

$$AWQC = \frac{(Risk\ Level \bullet BW)}{[CSF \bullet (DI + (FCR \bullet BAF))]}$$

where:

AWQC	=	Ambient Water Quality Criterion (milligrams per liter)
Risk Level	=	Risk level (unitless)
CSF	=	Cancer slope factor (milligrams per kilogram per day)
BW	=	Human body weight (kilograms)
DI	=	Drinking water intake (liters per day)
FCF	=	Fish Consumption Rate (kilograms per day)
BAF	=	Bioaccumulation factor (liters per kilogram)

For toxic pollutants identified as carcinogens and assumed to exhibit a linear dose-response relationship at low doses, EPA derives its national CWA § 304(a) human health criteria recommendations to correspond to incremental lifetime cancer risk levels, applying a risk management policy that ensures a reasonable level of protection for the general population.[30]

Accordingly, the cancer slope factor is included in the calculation. A cancer slope factor expresses incremental, lifetime risk of cancer as a function of the rate of intake of the contaminant, and is then combined with exposure assumptions to express that risk in terms of an ambient water concentration. Cancer slope factors are specific to individual pollutants. In deriving both the "water + organism" and "organism only" human health criteria for carcinogens, Oregon utilized the cancer slope factors recommended by EPA [14, 15]

EPA has identified a risk level range of 1×10^{-6} (1:1,000,000) to 1×10^{-5} (1:100,000) to be an appropriate risk management goal for the general population. EPA characterizes this acceptable risk range as the "upper-bound estimate of excess lifetime cancer risk," ranging from one case in a population of one million to one case in a population of ten thousand. The risk level associated with any given human health criterion is dependent upon the multiple exposure parameters used in deriving the criterion. The level of protection provided to any one individual or subpopulation will vary with variation in exposure. Thus, some criteria may protect some individuals or subpopulations at levels greater than 1×10^{-6}. Nothing limits a state's discretion to provide protection to specific subpopulation at 1×10^{-6} risk level even though it will mean that other subpopulations are protected at higher levels.

[30] EPA. 2000. *Revisions to the Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000)*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 65, Issue: 214, Page: 66443 (65 FR 66443), November 3, 2000. Available at: http://www.epa.gov/fedrgstr/EPA-WATER/2000/November/Day-03/w27924.htm.

EPA's 2000 Methodology provides states with the discretion to adopt human health criteria within, or above, this risk level range, if highly exposed populations would at least be protected at the 1 x 10^{-4} (1:10,000) risk level. If a state does not find that the 1 x 10^{-6} risk level adequately protects highly exposed populations, it has the discretion to adopt water quality criteria based on a more stringent risk level or a level more representative of highly exposed population groups. This discretion extends to all variables used to calculate the criteria. [31]

Oregon's new and revised "water + organism" and "organism only" human health criteria for carcinogens are calculated using a risk level of 1 x 10^{-6} (1:1,000,000). For exposure variables, (a body weight, fish consumption rate and drinking water intake rate, Oregon used the same values as used for non-carcinogens and described above.

Table 10. Oregon's July 8, 2004 submission of new and revised "water + organism" and "organism only" human health criteria for 55 carcinogens.

Chemical Name	"Water + Organism" Criteria (µg/L)	"Organism Only" Criteria (µg/L)
Acrylonitrile	0.051	0.25
Aldrin	0.000049	0.00005
Arsenic	0.018	0.14
Benzene	2.2	51
Benzidine	0.000086	0.0002
Benzo(a)Anthracene	0.0038	0.018
Benzo(a)Pyrene	0.0038	0.018
Benzo(b)Fluoranthene	0.0038	0.018
Benzo(k)Fluoranthene	0.0038	0.018
BHC alpha-	0.0026	0.0049
BHC beta-	0.0091	0.017
Bromoform	4.3	140
Carbon Tetrachloride	0.23	1.6
Chlordane	0.0008	0.00081
Chlorodibromomethane	0.4	13
Chloroethyl Ether Bis2-	n/a - not revised	0.53
Chloroform	5.7	470
ChloromethylEther, Bis	0.0001	0.00029
Chrysene	0.0038	0.018
DDD 4,4'-	0.00031	0.00031
DDE 4,4'-	0.00022	0.00022
DDT 4,4'-	0.00022	0.00022
Dibenzo(a,h)Anthracene	0.0038	0.018
Dichlorbenzidine 3,3'-	0.021	0.028
Dichlorobromomethane	0.55	17
Dichloroethane 1,2-	0.38	37
Dichloropropane 1,2-	0.5	15
Dichloropropene 1,3-	0.34	21

[31] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health.* U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Page 2-6.

Chemical Name	"Water + Organism" Criteria (µg/L)	"Organism Only" Criteria (µg/L)
Dieldrin	0.000052	0.000054
Dinitrotoluene 2,4-	n/a - not revised	3.4
Dioxin (2,3,7,8-TCDD)	0.000000005	0.0000000051
Diphenylhydrazine 1,2-	0.036	0.2
EthylhexylPhthalate Bis2-	1.2	2.2
Heptachlor	0.000079	0.000079
Heptachlor Epoxide	0.000039	0.000039
Hexachlorobenzene	0.00028	0.00029
Hexachlorobutadiene	0.44	18
Hexachloroethane	1.4	3.3
Ideno1,2,3-(cd) Pyrene	0.0038	0.018
Isophorone	35	960
Methylene Chloride	4.6	590
Nitrosodibutylamine,N	0.0063	0.22
Nitrosopyrrolidine,N	n/a - not revised	34
N-Nitrosodimethylamine	0.00069	3
N-Nitrosodi-n-Propylamine	0.005	0.51
N-Nitrosodiphenylamine	3.3	6
Pentachlorophenol	0.27	3
Polychlorinated Biphenyls PCBs	0.000064	0.000064
Tetrachloroethane 1,1,2,2-	n/a - not revised	4
Tetrachloroethylene	0.69	3.3
Toxaphene	0.00028	0.00028
Trichloroethane 1,1,2-	0.59	16
Trichloroethylene	2.5	30
Trichlorophenol 2,4,6-	1.4	2.4
Vinyl Chloride	0.025	2.4

b) EPA Review and Action

(1) Review of Values Used to Calculate Criteria

EPA's 2000 Human Health Methodology provides guidance for deriving human health criteria for toxic pollutants. For each variable used in the criteria calculation, EPA provides a "national default value" and guidance on specific adjustments that may be necessary to reflect local conditions and/or protect identifiable subpopulations. As part of evaluating whether Oregon's criteria protect the designated uses, EPA looked at the input values used by Oregon and whether there was Oregon-specific information relative to each value that should be considered in the review.

For all input variables, Oregon used EPA's recommended national default values for calculating their 2004 human health criteria. EPA has not identified any local or regional data to indicate that the national values for the cancer slope factors, reference dose, relative source contribution,

body weight, drinking water intake rate, or bioaccumulation factors are inappropriate for use in Oregon. [32]

EPA's initial review of local and regional fish consumption data indicated that such data was available and should be considered consistent with EPA's 2000 Methodology. The Methodology recognizes the variability of fish consumption rates among population groups and by geographic region. In employing the 2000 Methodology to derive criteria, the Agency urges States and Tribes to use a fish intake level derived from local or regional data instead of the national default recommendation to ensure the fish intake level chosen is protective of highly exposed individuals in the population and to ensure that adequate protection is afforded to all identifiable subpopulations. A four preference hierarchy concerning the use of fish consumption rate data is set forth: (1) use of local data; (2) use of data reflecting similar geography/population groups; (3) use of data from national surveys; and (4) use of EPA's default intake rate. In using local data, EPA recommends that arithmetic mean values should be the lowest value considered by states when choosing fish consumption rates for use in criteria derivation.[33]

In 1996, Oregon initiated an extensive review of the use of a fish consumption rate of 17.5 grams per day for deriving human health criteria protective of the people of Oregon (see Appendix A). As part of this, a group of regional experts were asked to provide their evaluation of local and regional fish consumption studies and provide their recommendations to ODEQ. As a result of this review, ODEQ recommended to their governing body, the Oregon Environmental Quality Commission, that Oregon's human health criteria be revised based on a fish consumption rate of 175 grams per day. On October 23, 2008 the Commission directed ODEQ to revise the Oregon Water Quality Standards to reflect that higher fish consumption rate.

(2) Evaluation of Level of Protection Provided by Criteria

EPA's WQS regulations require that criteria protect the designated uses. As noted previously, Oregon's human health criteria apply to waters with fishing and water supply uses and thus must be established at a level that will protect those uses. Therefore, EPA must evaluate whether the criteria protect the use.

The risk level associated with any given human health criterion is dependent upon the multiple exposure parameters that are included in the derivation of the criterion. Oregon's new and revised human health criteria for non-carcinogens were derived using a risk level of 1×10^{-6}. However, individuals with exposures outside of the values that Oregon utilized in the equation (for example, with either higher or lower rates of fish consumption) will have a different relative risk. For this reason, EPA first evaluated Oregon's new and revised criteria to determine the level of risk that may be experienced by those consuming fish at levels reported in the CRITFC

[32] On June 10, 2009, subsequent to Oregon's July 8, 2004, submittal, EPA updated its national CWA § 304(a) human health criteria recommendations for acrolein and phenol. These updated values incorporate new reference doses for acrolein and phenol.

[33] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Pages 1-9 to 1-13, 4-24 to 4-25.

study (see Appendix A) and then utilized the results of this evaluation to review the protectiveness of the human health criteria identified in Table 10 above.

(3) Risk Level Evaluation in Light of the Available Local and Regional Fish Consumption Rate Data

EPA evaluated Oregon's new and revised human health criteria for carcinogens to determine the level of risk that may be experienced by those consuming fish at levels reported in the CRITFC study. These risk levels, shown in Table 11 below, were calculated using fish consumption rates of 63, 113, 176, and 389 grams per day. As outlined in Appendix A, these values are reflective of rates of fish consumption documented from the CRITFC survey and representative of a subpopulation in Oregon. It should be noted that the same risk levels would be associated with criteria calculated at these consumption rates for all of the pollutants identified in Table 10.

A risk level of 1×10^{-6} is associated with those populations consuming fish at a rate of 17.5 grams per day, and represents one case of cancer in a population of one million. Risk levels of 3.6×10^{-6} and 6.5×10^{-6}, representing 3.6 and 6.5 cases of cancer in a population of one million, are associated with those populations consuming fish at rates of 63 grams per day and 113 grams per day, respectively. Risk levels of 1×10^{-5} and 2.5×10^{-5}, representing one and 2.5 cases of cancer in a population of one hundred thousand, are associated with those populations consuming fish at rates of 176 grams per day and 389 grams per day, respectively.

Table 11. Carcinogenic risk levels associated with Oregon's human health criteria for populations consuming fish at rates of 17.5, 63, 113, 176, and 389 grams per day. These risk levels are associated with Oregon's 55 new and revised human health criteria for carcinogenic pollutants identified in Table 10.

Fish Consumption Rate (grams per day)	Risk Levels Associated with Oregon's New and Revised Criteria for a Population Consuming Fish at Identified Fish Consumption Rates
17.5	1×10^{-6}
63	3.6×10^{-6}
113	6.5×10^{-6}
176	1×10^{-5}
389	2.2×10^{-5}

EPA's 2000 Methodology recognizes that states may exercise their discretion to adopt human health criteria within a risk level range of 1×10^{-6} to 1×10^{-5}, if highly exposed populations would at least be protected at the 1×10^{-4} (1:10,000) risk level. However, if a state does not believe that a 1×10^{-6} risk level for the general population would adequately protect highly exposed populations, the 2000 Methodology also recognizes that states may exercise their discretion to adopt human health criteria based on a more stringent risk level. This discretion

includes combining the 1 x 10^{-6} risk level with an exposure variable value (e.g., fish consumption rate) that is more representative of highly exposed population groups.

On October 23, 2008, Oregon's policy-making body for environmental issues, the OEQC, exercised its discretion and directed ODEQ to pursue rulemaking to revise Oregon's human health toxics criteria statewide based upon an increased fish consumption rate of 175 grams per day. ODEQ is currently drafting a rule that would propose human health criteria using a fish consumption rate of 175 grams per day and a risk level of 1 x 10^{-6}. As described in Appendix A, this directive was issued following extensive review by ODEQ, including the review of scientifically defensible data relevant to Oregon and the input from human health experts.

Thus, Oregon intends to use its discretion to develop criteria that would protect highly exposed populations in Oregon consuming up to 175 grams of fish per day at a risk level of 1 x 10^{-6}. In contrast, the human health criteria for the 55 carcinogens identified in Table 10 would protect those who consume up to 175 grams of fish per day at a less stringent risk level of 1 x 10^{-5}.

The OEQC's 2008 directive represents the latest policy direction provided to ODEQ on this issue and thus the latest information available to EPA concerning Oregon's risk management goals relative to human health criteria. Based upon the risk levels calculated for those eating more than 17.5 grams of fish per day (Table 11 above), EPA has determined that Oregon's 2004 new and revised "water + organism" and "organism only" human health criteria for the 55 carcinogens identified in Table 10 above do not protect the fishing designated use in Oregon consistent with the OEQC's 2008 directive and the risk management goals relative to human health criteria represented within this directive. The OEQC is the executive body within the State of Oregon charged with establishing the environmental policies by which the waters of the state will be protected, maintained, and improved "for public water supplies, for the propagation of wildlife, fish and aquatic life and for domestic, agricultural, industrial, municipal, recreational and other legitimate beneficial uses." Or. Rev. Stat. § 468B.015, *see also* Or. Rev. Stat. § 468.015. Therefore, OEQC's 2008 directive represents a determination that protecting persons consuming 175 grams of fish per day at a risk level of 1 x 10^{-5} is insufficiently stringent to protect the waters of the State, consistent with the policies of the State of Oregon.

Section 303(c)(2)(A) of the CWA provides that when a state revises or adopts new water quality standards, the new or revised standard shall be "such as to protect the public health or welfare, enhance the quality of water and serve the purposes of the Act." When the state submits these standards to EPA, EPA must then review them to determine whether they are consistent with the requirements of the CWA. CWA § 303(c)(3); 40 CFR 131.5, 131.11. In the present instance, Oregon has effectively determined that the human health criteria for the 55 carcinogens identified in Table 10 are insufficiently stringent to protect Oregon waters consistent with the policies of the State of Oregon. Because Oregon has made this determination during the pendency of EPA's review of these criteria, EPA considered the determination as part of its evaluation of whether the 2004 criteria are consistent with the requirements of the CWA.

As previously noted, Oregon waters identified in Tables 1 and 2 above have a fishing designated use. Because the Oregon policy-making body charged with protecting such use under state law

has issued a post-submission directive, during the pendency of EPA's review, that can be reasonably construed as indicating that the 2004 criteria are insufficient to protect Oregon waters, EPA has determined that the new and revised human health criteria identified in Table 10 above are not protective of Oregon's fishing designated use, as currently set forth by the OEQC.

(4) Disapproval

Based upon the above evaluation and in accordance with its CWA authority, 33 *U.S.C.* § 1313(c)(3) and 40 CFR Part 131, EPA disapproves Oregon's new and revised "water + organism" and "organism only" human health criteria for the 55 carcinogens identified in Table 10 above which are included in Table 33A of Oregon's WQS submitted to EPA on July 8, 2004.

2. Asbestos

a) Criterion Derivation

Consistent with EPA's 304(a) recommendation, Oregon adopted a new human health criterion of seven million fibers per liter for asbestos (see Table 12 below). Since the human health risks from asbestos are primarily from drinking water, no "organism only" criterion was adopted. The 'water + organism" criterion was established at the level of EPA's drinking water criterion under the Safe Drinking Water Act (SDWA).

(1) Protectiveness Evaluation

Table 12. Oregon's July 8, 2004 submission of new human health criterion for asbestos.

Chemical Name	"Water + Organism" Criterion (fibers per liter (f/L))	"Organism Only" Criterion
Asbestos	7,000,000	n/a

b) EPA Review and Action

(1) Protectiveness Evaluation

Fish consumption is not an exposure pathway used in the derivation of EPA's national criterion recommendation and therefore fish consumption rates are not relevant to evaluation of the protectiveness of this criterion. Oregon's asbestos criterion applies to all waters in Oregon designated for either public domestic water supply or private domestic water supply, irrespective of whether a fishing use has been designated.[34] As such, the criterion appropriately applies to waters identified in Table 1 above, as well as the Bull Run River and its tributaries in the Sandy Basin.

Oregon's new human health water quality criterion for asbestos is consistent with EPA's current 304(a) criterion recommendation and is the same as the drinking water criterion established

[34] ODEQ. 2009. Email communication dated June 9, 2009, from Deb Sturdevant, WQS Program Lead, Oregon Department of Environmental Quality to Melinda McCoy, WQS Coordinator, EPA.

under the SDWA.[35] EPA has not found any local or regional data indicating this value to be inappropriate for Oregon.

Based on this information, EPA finds that Oregon's human health criterion for asbestos is protective of Oregon's public domestic water supply and private domestic water supply designated uses. Therefore, it is consistent with the federal requirements at 40 CFR § 131.11(a)(1).

(2) Approval

Based on the above evaluation and in accordance with its CWA authority, 33 *U.S.C.* § 1313(c)(3) and 40 CFR Part 131, EPA approves Oregon's new human health criterion for asbestos identified in Table 12 above which is included in Table 33A of Oregon's WQS.

IV. NEW FOOTNOTES

In addition to adopting the new and revised human health criteria described in Part III above, Oregon adopted seven new footnotes (H, I, J, K, L, R, and U) associated with human health criteria. Three of these footnotes (H, J, and L) are discussed separately in Part VII below because they are not considered WQS subject to EPA review and approval under § 303(c) of the CWA. The other four are discussed below.

Six of the seven footnotes were added to criteria that were new or revised in 2004 while Footnote K was added to two existing criteria. EPA's action to approve or disapprove a footnote only applies to the footnote and not the underlying criteria.

All other footnotes included in Table 33A of Oregon's WQS and applicable to human health criteria remain unchanged from Oregon's previous WQS. Thus, EPA is not taking action on these previously existing footnotes. This is appropriate since these footnotes remain applicable to the chemicals with which they are associated, and this applicability is not altered by any WQS revisions included in Oregon's July 8, 2004, submittal.

A. *Footnote I*

1. Description of Footnote

As shown in Table 13 below, Oregon added footnote I to the revised human health criteria for endosulfan (criteria discussed in Part III.A.1. above). Footnote I states: "This value is based on 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."

[35] EPA. 2006. *2006 Edition of Drinking Water Standards and Health Advisories*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-R-06-013. Available at: http://www.epa.gov/waterscience/criteria/drinking/dwstandards.pdf

Table 13. Addition of Footnote I as submitted by Oregon on July 8, 2004.

Chemical Name	"Water + Organism" Criterion (µg/L)	"Organism Only" Criterion (µg/L)
Endosulfan	62 I	89 I

2. EPA Review and Action

Footnote I provides clarification regarding the basis for Oregon's derivation of the endosulfan criteria. Footnote I also provides that the human health criteria for endosulfan should be applied as the sum of alpha- and beta-endosulfan. While applicable to the new criteria, the footnote is not applicable to Oregon's current CWA-applicable criteria for endosulfan. Because footnote I directly affects how the endosulfan criteria are applied with respect to the forms of endosulfan, EPA considers this footnote to be a WQS requiring action under CWA § 303(c).

EPA disapproves the addition of footnote I because this footnote applies to human health criteria that have been disapproved due to inconsistency with 40 CFR § 131.11(a) and is not applicable to any of Oregon's current CWA-applicable criteria. Since this footnote is reasonable when applied to the new criteria, no change in substance of this footnote would be needed to address the disapproval as long as the underlying criteria were revised by Oregon in a manner approvable by EPA.

B. *Footnote K*

1. Description of Footnote

As shown in Table 14 below, Oregon added footnote K to the existing and unrevised human health criteria for iron and manganese. Footnote K states: "Human Health criterion is for "dissolved" concentration based on the 1976 EPA Red Book conclusion that adverse effects from exposure at this level are aesthetic rather than toxic."

Table 14. Addition of Footnote K as submitted by Oregon on July 8, 2004.

Chemical Name	"Water + Organism" Criteria (µg/L)	"Organism Only" Criterion (µg/L)
Iron	300 K	n/a
Manganese	50 K	100 K

2. EPA Review and Action

Oregon's three human health criteria values for iron and manganese shown in Table 14 above are based upon EPA's national CWA § 304(a) human health criteria recommendations presented in EPA's 1986 "Gold Book." For iron and manganese, the "Gold Book" carries forward previous national CWA § 304(a) human health criteria recommendations presented in EPA's 1976 *Quality Criteria for Water* (hereinafter referred to as the "Red Book") and in EPA's 1972 *Water Quality Criteria* (hereinafter referred to as the "Blue Book").[36, 37]

[36] EPA. 1976. *Quality Criteria for Water* ("Red Book"). U.S. Environmental Protection Agency, Office of Water,

Footnote K was added to the three existing and unrevised human health criteria for iron and manganese shown in Table 14 above. It explains that the three criteria shown in Table 14 protect against adverse aesthetic effects rather than toxic adverse effects to human health. This is consistent with the information presented in EPA's "Gold Book," "Red Book," and "Blue Book," insofar as it applies to the "water + organism" criteria for iron and manganese. However, the "organism only" criterion for manganese is based on human health toxicity endpoints related to the consumption of marine mollusks.

Footnote K provides that the three criteria for iron and manganese shown in Table 14 are for the dissolved, as opposed to total, form of metal. Because this component of footnote K directly affects how the iron and manganese criteria are applied with respect to the forms of these two metals, EPA considers this footnote to be a WQS requiring action under CWA § 303(c).

EPA's 1972 "Blue Book" specifies that the "water + organism" criteria for iron and manganese are for the "soluble" (i.e., dissolved) form of the metal, while the "organism only" criterion for manganese is for total manganese. EPA's policy is to express metals criteria in the dissolved form only for aquatic life criteria where a total-to-dissolved translator is available. In the case of manganese, neither of these conditions apply.[38] Therefore, unless supporting documentation pursuant to 40 CFR § 131.6(b) is provided to demonstrate that expression of the "organism only" criterion for manganese as a dissolved criterion is protective of the fishing designated use in Oregon, EPA can not ensure the expression of the manganese criterion in the dissolved form is protective of the uses'

Based upon the above evaluation, EPA approves Oregon's addition of footnote K to the "water + organism" criteria for iron and manganese. However, EPA disapproves Oregon's addition of footnote K to the "organism only" criterion for manganese.

C. *Footnote R*

1. Description of Footnote

As shown in Table 15 below, Oregon added footnote R to the revised human health criteria for arsenic (criteria discussed in Part III.B.1. above). Footnote R states: "Arsenic criterion refers to the inorganic form only."

Table 15. Addition of Footnote R as submitted by Oregon on July 8, 2004.

Chemical Name	"Water + Organism" Criterion (µg/L)	"Organism Only" Criterion (µg/L)
Arsenic	0.018 R	0.14 R

Washington, D.C. PB-263 943. Available at: http://www.epa.gov/waterscience/criteria/library/redbook.pdf.

[37] EPA. 1972. *Water Quality Criteria* ("Blue Book"). U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA-R3-73-033.

[38] USEPA. October 1, 1993. Memorandum from Martha G. Prothro, Acting Assistant Administrator for Water, to Water Management Division Directors and Environmental Services Division Directors, Regions I - X. Re: Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria.

2. EPA Review and Action

Footnote R provides that the human health criteria for arsenic refer to the inorganic form of arsenic. While applicable to the new criteria, the footnote is not applicable to Oregon's current CWA-applicable criteria for arsenic. Because footnote R directly affects how the arsenic criteria are applied with respect to the forms of arsenic, EPA considers this footnote to be a WQS requiring action under CWA § 303(c).

EPA disapproves the addition of footnote R because this footnote applies to human health criteria that have been disapproved due to inconsistency with 40 CFR § 131.11(a) and is not applicable to any of Oregon's current CWA-applicable criteria. Since this footnote is reasonable when applied to the new criteria, no change in substance of this footnote would be needed to address the disapproval as long as the underlying criteria were revised by Oregon in a manner approvable by EPA.

D. *Footnote U*

1. Description of Footnote

As shown in Table 16 below, Oregon added footnote U to the revised human health criteria for polychlorinated biphenyls (PCBs) (criteria discussed in Part III.B.1. above). Footnote U states: "This criterion applies to total PCBs (e.g., the sum of all congener or all isomer or homolog or Arochlor analyses."

Table 16. Addition of Footnote U as submitted by Oregon on July 8, 2004.

Chemical Name	"Water + Organism" Criterion (µg/L)	"Organism Only" Criterion (µg/L)
Polychlorinated Biphenyls PCBs	0.000064 U	0.000064 U

2. EPA Review and Action

Footnote U provides that the human health criteria for PCBs apply to total PCBs. While applicable to the new criteria, the footnote is not applicable to Oregon's current CWA-applicable criteria for PCBs. Because footnote U directly affects how the criteria for PCBs are applied with respect to the various forms of PCBs, EPA considers this footnote to be a WQS requiring action under CWA § 303(c).

EPA disapproves the addition of footnote U because this footnote applies to human health criteria that have been disapproved due to inconsistency with 40 CFR § 131.11(a) and is not applicable to any of Oregon's current CWA-applicable criteria. Since this footnote is reasonable when applied to the new criteria, no change in substance of this footnote would be needed to address the disapproval as long as the underlying criteria was revised by Oregon in a manner approvable EPA.

V. WITHDRAWAL OF HUMAN HEALTH WATER QUALITY CRITERIA FOR EIGHT TOXIC POLLUTANTS

A. *Description of Withdrawn Criteria*

Consistent with EPA's current 304(a) criteria recommendations and as described in Section 1.2.2 of ODEQ's *Toxic Compounds Criteria: 1999-2003 Water Quality Standards Review Issue Paper*, Table 33A of Oregon's submission reflects Oregon's withdrawal of human health criteria for eight toxic pollutants.[39] These pollutants and criteria are identified in Table 17 below.[40]

Table 17. Numeric human health water quality criteria for eight toxic pollutants that were withdrawn from Oregon's WQS and submitted by Oregon on July 8, 2004.

Chemical Name	Human Health Criteria Withdrawn (in µg/L)	
	"Water + Organism"	"Organism Only"
Beryllium	0.0068	0.117
Cadmium	10	n/a
Chromium III	170,000	3,433,000
Chromium VI	50	n/a
Lead	50	n/a
Mercury	0.144	0.146
Silver	50	n/a
Trichloroethane 1,1,1-	18,400	1,030,000

1. Beryllium

Consistent with EPA's action under the "National Toxics Rule" (NTR),[41] Oregon withdrew its human health criteria for beryllium (Table 17 above). Under the NTR, EPA determined that its 304(a) human health criteria recommendations for beryllium, previously published in EPA's 1980 *Ambient Water Quality Criteria for Beryllium*,[42] were no longer scientifically defensible. Accordingly, EPA withdrew its recommendations for beryllium pending evaluation of relevant data regarding beryllium toxicity. EPA has not published new national CWA § 304(a) human

[39] ODEQ. 2003. *Toxic Compounds Criteria: 1999-2003 Water Quality Standards Review Issue Paper*. Oregon Department of Environmental Quality, Portland, Oregon. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/may2004/5.20.04.ItemB.AttchH.pdf.

[40] Table 17 was created by comparing Table 20 (Oregon's previous water quality criteria) with Table 33A (Oregon's updated water quality criteria). Oregon's Issue Paper did not specify that Oregon had never adopted criteria for 2,6-Dinitrotoluene and thus Oregon did not withdraw this criteria as part of its 2004 action.

[41] EPA. 1992. *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliances ("National Toxics Rule")*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. *Federal Register*, Volume: 57, Issue: 246, Page: 60885 (57 FR 60885), Tuesday, December 22, 1992.

[42] EPA. 1980. *Ambient Water Quality Criteria for Beryllium*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-80-024. Available at: http://www.epa.gov/waterscience/criteria/library/ambientwqc/berryllium80.pdf

health criteria recommendations for beryllium.

2. Cadmium

Consistent with EPA's action under the NTR, Oregon withdrew its human health criterion for cadmium (Table 17 above). Under the NTR, EPA determined that its 304(a) human health criterion recommendation for cadmium, previously published in EPA's 1980 *Ambient Water Quality Criteria for Cadmium*,[43] was no longer scientifically defensible. Accordingly, EPA withdrew its recommendation for cadmium pending evaluation of relevant data regarding cadmium toxicity. EPA has not published a new national CWA § 304(a) human health criterion recommendation for cadmium.

3. Chromium III

Consistent with EPA's action under the NTR, Oregon withdrew its human health criteria for chromium III (Table 17 above). Under the NTR, EPA determined that its 304(a) human health criteria recommendations for chromium III, previously published in EPA's 1980 *Ambient Water Quality Criteria for Chromium*,[44] were no longer scientifically defensible. Accordingly, EPA withdrew its recommendations for chromium III pending evaluation of relevant data regarding chromium III toxicity. EPA has not published new national CWA § 304(a) human health criteria recommendations for chromium III.

4. Chromium VI

Consistent with EPA's action under the NTR, Oregon withdrew its human health criterion for chromium VI (Table 17 above). Under the NTR, EPA determined that its 304(a) human health criterion recommendation for chromium VI, previously published in EPA's 1980 *Ambient Water Quality Criteria for Chromium*,[50] was no longer scientifically defensible. Accordingly, EPA withdrew its recommendation for chromium VI pending evaluation of relevant data regarding chromium VI toxicity. EPA has not published a new national CWA § 304(a) human health criterion recommendation for chromium VI.

5. Lead

Consistent with EPA's action under the NTR, Oregon withdrew its human health criterion for lead (Table 17 above). Under the NTR, EPA determined that there was an insufficient basis for deriving a human health criterion recommendation for lead. Accordingly, pending further analysis, EPA withdrew its recommendation for lead, which had been previously published in

---

[43] EPA. 1980. *Ambient Water Quality Criteria for Cadmium*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-80-025. Available at: http://www.epa.gov/waterscience/criteria/library/ambientwqc/cadmium80.pdf

[44] EPA. 1980. *Ambient Water Quality Criteria for Chromium*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-80-035. Available at: http://www.epa.gov/waterscience/criteria/library/ambientwqc/chromium80.pdf

EPA's 1980 *Ambient Water Quality Criteria for Lead*.[45] EPA has not published a new national CWA § 304(a) human health criterion recommendation for lead.

6. Mercury

On January 8, 2001, EPA withdrew its national CWA § 304(a) human health criteria recommendations for total mercury, and replaced these criteria recommendations with a new fish tissue-based "organism only" human health criterion for methylmercury.[26] This revision was based on updated scientific information that indicated consumption of contaminated fish and shellfish is the primary route of exposure to methylmercury. Consistent with EPA's action on January 8, 2001, Oregon withdrew its human health criteria for total mercury (Table 17 above), and adopted the new 304(a) human health criterion recommendation for methylmercury. Oregon's new methylmercury criterion is addressed separately in Part III.A.2. above.

7. Silver

Consistent with EPA's action under the NTR, Oregon withdrew its human health criterion for silver (Table 17 above). Under the NTR, EPA withdrew its 304(a) human health criterion recommendation for silver, previously published in EPA's 1980 *Ambient Water Quality Criteria for Silver*.[46] EPA determined that the only potential adverse effect from exposure to silver in drinking water is argyria (a discoloration of the skin). Argyria is a cosmetic effect, not a toxicological effect, and therefore inappropriate to serve as a basis for developing human health criteria. EPA has not published a new § 304(a) human health criterion recommendation for silver.

8. Trichloroethane 1,1,1-

Consistent with EPA's action under the NTR, Oregon withdrew its human health criteria for 1,1,1-trichloroethane (Table 17 above). Under the NTR, EPA determined that there was an insufficient basis for deriving 304(a) human health criteria recommendations for 1,1,1-trichloroethane. Accordingly, pending further analysis, EPA withdrew its recommendations for 1,1,1-trichloroethane, previously published in EPA's 1980 *Ambient Water Quality Criteria for Chlorinated Ethanes*.[47] EPA has not published new national CWA § 304(a) human health criteria recommendations for 1,1,1-trichloroethane.

---

[45] EPA. 1980. *Ambient Water Quality Criteria for Lead*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-80-057. Available at: http://www.epa.gov/waterscience/criteria/library/ambientwqc/lead80.pdf.

[46] EPA. 1980. *Ambient Water Quality Criteria for Silver*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-80-071.

[47] EPA. 1980. *Ambient Water Quality Criteria for Chlorinated Ethanes*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 440/5-80-029. Available at: http://www.epa.gov/waterscience/criteria/library/ambientwqc/chlorietha80.pdf.

B. *EPA Review and Action*

The CWA requires that, whenever a state or authorized tribe revises or adopts new WQS, it adopt criteria for all toxic pollutants listed pursuant to CWA § 307(a)(1) for which EPA has developed recommended criteria under CWA § 304(a), the discharge or presence of which in the affected waters could reasonably be expected to interfere with the adopted designated uses (CWA § 303(c)(2)(B)). National CWA § 304(a) human health criteria recommendations are not currently available for the eight toxic pollutants identified in Table 17 above. Therefore, Oregon's withdrawal of its previous human health water quality criteria for these eight toxic pollutants is consistent with this requirement of CWA § 303(c)(2)(B). If situations arise where human health uses need to be protected from impacts from these pollutants, Oregon may apply their narrative toxics criteria at OAR 340-041-0033 to provide such protection.

Based upon the above evaluation and in accordance with its CWA authority, 33 *U.S.C.* §1313(c)(3) and 40 CFR Part 131, EPA approves Oregon's withdrawal of the human health criteria identified in Table 17 above.

VI. REVISIONS TO NARRATIVE TOXICS PROVISIONS

Oregon's July 8, 2004, WQS submittal included revisions to its narrative toxics provisions found at OAR 340-041-0033(1) through (3). Revisions to OAR 340-041-0033(1) and (2) are discussed in this Part. Revisions to OAR 340-041-0033(3) are discussed in Part VII below because they are not considered WQS subject to EPA review and approval under § 303(c) of the CWA.

A. *OAR 340-041-0033(1)*

1. Description of Revisions

Oregon's revisions to its narrative toxics provision found at OAR 340-041-0033(1) are shown in underline/strikeout format below. Underlined text represents added text, while text with a line through the middle (strikeout) represents deleted text. Non-revised words are provided for context.

> (1) Toxic substances may not be introduced above natural background levels in ~~the~~ waters of the ~~S~~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. EPA Review and Action

EPA approves the minor editorial changes as non-substantive revisions to this provision under

§303(c) of the CWA. The changes in this provision do not alter the meaning or substance of the underlying WQS previously approved by EPA. EPA approves these editorial changes and considers them in effect under the CWA.

B. *OAR 340-041-0033(2)*

1. Description of Revisions

Oregon's revisions to its narrative toxics provision found at OAR 340-041-0033(2) are shown in underline/strikeout format below. Underlined text represents added text, while text with a line through the middle (strikeout) represents deleted text. Non-revised words are also provided below for context.

> (2) [48] Levels of toxic substances in waters of the state may not exceed the applicable criteria listed in Tables 20, 33A, and 33B. ~~which were based on criteria established by EPA and published in Quality Criteria for Water (1986), unless otherwise noted;~~ Table 33A and 33B, adopted on (date),[49] update Table 20 as described in this section.
>
> (b) [50] Each value for criteria in Table 20 is effective until the corresponding value in Tables 33A or 33B becomes effective.
>
> (A) Each value in Table 33A is effective on February 15, 2005, unless EPA has disapproved the value before that date. If a value is subsequently disapproved, any corresponding value in Table 20 becomes effective immediately. Values that are the same in Tables 20 and 33A remain in effect.
>
> (B)[51] Each value in Table 33B is effective upon EPA approval.
>
> (c) [52] The department will note the effective date for each value in Tables 20, 33A, and 33B as described in this section.

---

[48] Note that for purposes of identification in this technical support document, EPA hereinafter refers to this provision as provision "OAR 340-041-0033(2)(a)."

[49] In the submission to EPA on July 8, 2004, this provision did not identify the adopted date of May 20, 2004. In the current version of Oregon's WQS, "(date)" has been replaced with "May 20, 2004".

[50] The identification of this provision as (b) corresponds to that at the time of submission to EPA on July 8, 2004. Current Oregon WQS identify this provision as (a).

[51] Oregon's July 8, 2004, WQS submittal did not include any new or revised human health criteria in Table 33B. However, on February 22, 2007, the OEQC adopted formatting changes recommended by ODEQ in which those human health criteria that became less stringent in 2004 were moved from Table 33A to Table 33B. In addition, on February 22, 2007, the OEQC adopted clarifying language located at the beginning of Tables 33A and 33B which re-iterate the information contained in the revisions to OAR 340-041-0033(2) that were submitted to EPA on July 8, 2004. EPA plans to take separate action on the WQS revisions associated with Oregon's February 22, 2007, adoption.

[52] The identification of this provision as (c) corresponds to that at the time of submission to EPA on July 8, 2004. Current Oregon WQS identify this provision as (b).

2. EPA Review and Action

Oregon's narrative toxics provision at OAR 340-041-0033(2)(a) was revised to: (1) update the toxics criteria table references in Oregon's WQS in order to reflect the addition of Tables 33A and 33B; (2) clarify that the applicable toxics criteria listed in Tables 20, 33A, and 33B apply to waters of the state; and (3) delete a reference to EPA's 1986 "Gold Book."

Table 20, 33A and 33B include numeric criteria for both human health and aquatic life. Tables 33A and 33B are intended to replace Table 20 after EPA takes action on the revisions to the numeric criteria. Table 33A is intended to include numeric criteria which were not revised or were revised to become more stringent than Oregon's previous criteria. Table 33B is intended to include numeric criteria that were revised to become less stringent than Oregon's previous criteria.

EPA approves the revisions to the language in OAR 340-041-0033(2)(a) under § 303(c) of the CWA. The language changes describe the relationship between Tables 20, 33A and 33B. EPA's action on this provision does not address the underlying criteria in the tables. EPA has addressed the new and revised underlying human health (including corresponding new footnotes) in Parts III, IV, and VII of this document. EPA will address the aquatic life criteria in these tables (including their corresponding footnotes) in a separate action.

The new provisions at OAR 340-041-0033(2)(b), (2)(b)(A), (2)(b)(B) and (2)(c) describe dates when the toxics criteria in Tables 20, 33A and 33B become effective under state law. The effective date of WQS provisions under the CWA is determined by the date of EPA approval. These timing provisions are WQS that provide for the new and revised numeric criteria to be immediately in effect at the point of EPA approval action. Therefore, EPA approves the language in these new provisions as consistent with the requirements of CWA § 303(c). EPA has addressed the new and revised underlying human health criteria (including corresponding new footnotes) in Parts III, IV, and VII of this technical support document. EPA will address the aquatic life criteria in these tables and their corresponding footnotes in a separate action.

VII. PROVISIONS THAT DO NOT REQUIRE ACTION UNDER CWA § 303(C)

A. *Revisions to Narrative Toxics Provision at OAR 340-041-0033(3)*

1. Description of Revisions

Oregon's revisions to its narrative toxics provision found at OAR 340-041-0033(3) are shown in underline/strikeout format below. Underlined text represents added text, while text with a line through the middle (strikeout) represents deleted text. Non-revised words are provided for context.

(3) ~~The criteria in section (2) of this rule must apply unless data from scientifically valid studies demonstrate that the most sensitive designated beneficial uses will not be adversely affected by exceeding a criterion or that a more restrictive criterion is warranted to protect beneficial uses, as accepted by the Department on a site specific basis.~~ To establish permit or other regulatory limits for toxic substances for which criteria are not included in Tables 20, 33A, or 33B, the department may use the guidance values in Table 33C, ~~Where no published EPA criteria exist for a toxic substance,~~ public health advisories, and other published scientific literature. ~~may be considered and used, if appropriate, to set guidance values;~~

~~(4) If the~~The ~~D~~department ~~determines~~ may also require or conduct bio-assessment studies ~~that it is necessary~~ to monitor the toxicity to aquatic life of complex effluents, other suspected discharges, or chemical substances without numeric criteria. ~~to aquatic life, then bio-assessment studies may be conducted. Laboratory bioassays or in-stream measurements of indigenous biological communities, properly conducted in accordance with standards testing procedures, may be considered as scientifically valid data for the purposes of section (3) of this rule. If toxicity occurs, the Department will evaluate and implement necessary measures to reduce or eliminate the toxicity on a case-by-case basis.~~

2. EPA Review

Oregon's narrative toxics provision at OAR 340-041-0033(3) was combined with OAR 340-041-0033(4) to update and clarify guidance for establishing permit or other regulatory limits for toxic substances not included in Tables 20, 33A or 33B. OAR 340-041-0033(3) establishes that the department may use the guidance values in Table 33C, public health advisories, and other published scientific literature. This provision and its revisions are not considered WQS subject to EPA review and approval under § 303(c) of the CWA. This provision describes implementation procedures for the narrative toxics criterion at OAR 340-041-0033(1). EPA believes the provision is reasonable, and acknowledges that it is consistent with 40 CFR 131.11, which requires states (either in their water quality standards or a separate document) to "provide information identifying the method by which the State intends to regulate point source discharges of toxic pollutants on water quality limited segments based on . . . narrative criteria." However, this particular implementation provision is not a water quality standard because it does not establish a legally binding requirement under state law, and it does not describe a desired ambient condition of a waterbody to support a particular designated use. Instead, it is a non-exclusive list of sources that may be used to interpret the narrative toxics criterion, for pollutants without numeric criteria. Because the provision is not a water quality standard, EPA is taking no action to approve or disapprove revisions to this provision.

Furthermore, the guidance values in Table 33C are not considered WQS under the CWA. Instead, the guidance values are one of several sources that can be used to interpret the narrative toxics criterion at OAR 340-041-0033(1). The guidance values in Table 33C are not adopted as criteria and, if used, the state would need to document why the number is appropriate for an

individual action. For this reason, EPA is taking no action to approve or disapprove the values in Table 33C.

Revisions to the portion of the provision formerly identified as OAR 340-041-0033(4) state that the department may also require or conduct bioassessment studies to monitor the toxicity to aquatic life of complex effluents, other suspected discharges or chemical substances without numeric criteria. This provision simply states that Oregon may conduct bioassessment studies for monitoring purposes. The provision is not a water quality criterion because it does not establish a legally binding requirement under state law, and it does not describe a desired ambient condition of a waterbody to support a particular designated use. Instead, it relates to the department's authority to develop information by requiring or conducting studies. Therefore, this provision is not considered a WQS subject to EPA review and approval under § 303(c) of the CWA. EPA is therefore taking no action to approve or disapprove revisions to this provision.

B. *New Footnotes*

On May 20, 2004, Oregon adopted three new footnotes (H, J, and L) associated with human health criteria and not considered WQS. In addition, Oregon identified a fourthe new footnote in a November 28, 2005 errata letter. These new footnotes are discussed below.

1. Footnote H

a) Description of Footnote

As shown in Table 18 below, Oregon added footnote H to the new human health criterion for copper (criterion discussed in Part III.A.3. above). Oregon also added footnote H to the pre-existing and unrevised human health criteria for chlorophenoxy herbicide (2,4,5,-TP) and chlorophenoxy herbicide (2,4-D). Footnote H states: "This value is based on a Drinking Water regulation."

Table 18. Addition of Footnote H as submitted by Oregon on July 8, 2004.

Chemical Name	"Water + Organism" Criteria (µg/L)	"Organism Only" Criteria
Copper	1300 H	n/a
Chlorophenoxy Herbicide (2,4,5,-TP)	10 H	n/a
Chlorophenoxy Herbicide (2,4-D)	100 H	n/a

b) EPA Review

Oregon added footnote H to the criteria shown in Table 18 above in order to clarify the source of information upon which the criteria are based. The human health criterion for copper, chlorophenoxy herbicide (2,4,5,-TP) and chlorophenoxy herbicide (2,4-D) are equivalent to drinking water criteria adopted under the SDWA.[53]

[53] See Appendix C of EPA's 1986 *Quality Criteria for Water* ("Gold Book") (previously referenced).

The provision is not a water quality criterion because it does not establish a legally binding requirement under state law, and it does not describe a desired ambient condition of a waterbody to support a particular designated use. Instead, it clarifies the source of information upon which the criteria are based. Therefore, this provision is not considered a WQS subject to EPA review and approval under § 303(c) of the CWA. EPA is therefore taking no action to approve or disapprove footnote H.

2. Footnote J

a) Description of Footnote

As shown in Table 19 below, Oregon added footnote J to the existing and unrevised human health criteria for hexachlorocyclo-hexane-technical, methoxychlor, nitrates, nitrosamines, and nitrosodiethylamine, N. Footnote J states: "No BCF was available; therefore, this value is based on that published in the 1986 EPA Gold Book."

Table 19. Addition of Footnote J as submitted by Oregon on July 8, 2004.

Chemical Name	"Water + Organism" Criteria (µg/L)	"Organism Only" Criteria (µg/L)
Hexachlorocyclo-hexane-Technical	0.0123 J	0.0414 J
Methoxychlor	100 J	n/a
Nitrates	10000 J	n/a
Nitrosamines	0.0008 J	1.24 J
Nitrosodiethylamine,N	0.0008 J	1.24 J

b) EPA Review

Oregon added footnote J to the criteria shown in Table 19 above in order to clarify the source of information upon which these criteria are based. These criteria were not deriving using EPA's 2000 Methodology, but instead were based upon EPA's national CWA § 304(a) human health criteria recommendations provided in EPA's 1986 "Gold Book."

The provision is not a water quality criterion because it does not establish a legally binding requirement under state law, and it does not describe a desired ambient condition of a waterbody to support a particular designated use. Instead, it clarifies the source of information upon which the criteria are based. Therefore, this provision is not considered a WQS subject to EPA review and approval under § 303(c) of the CWA. EPA is therefore taking no action to approve or disapprove footnote J.

3. Footnote L

a) Description of Footnote

As shown in Table 20 below, Oregon added footnote L to the new human health criterion for methylmercury (criterion discussed in Part III.A.2. above). Footnote L states: "This value is expressed as the fish tissue concentration of methylmercury."

Table 20. Addition of Footnote L as submitted by Oregon on July 8, 2004.

Chemical Name	"Water + Organism" Criterion	"Organism Only" Criterion (µg/kg)
Methylmercury	n/a	300 L

b) EPA Review

Footnote L provides clarification that the human health criterion for methylmercury is expressed as a fish tissue concentration rather than as a water column concentration. The provision is not a water quality criterion because it does not establish a legally binding requirement under state law, and it does not describe a desired ambient condition of a waterbody to support a particular designated use. Instead, it restates a fact that is already included in the approved criterion. Therefore, this provision is not considered a WQS subject to EPA review and approval under § 303(c) of the CWA. EPA is therefore taking no action to approve or disapprove footnote L.

4. Footnote for Asbestos

a) Description of Footnote

In the November 28, 2005 errata letter to EPA, ODEQ noted the addition of a footnote for asbestos states: "This asbestos criterion is the Maximum Contaminant Level (MCL) developed under the Safe Drinking Water Act."

b) EPA Review

This footnote was added to clarify the source of information upon which these criteria are based. This criterion was not derived using EPA's 2000 Methodology, but instead was based upon a criterion developed under the Safe Drinking Water Act.

The provision is not a water quality criterion because it does not establish a legally binding requirement under state law, and it does not describe a desired ambient condition of a waterbody to support a particular designated use. Instead, it clarifies the source of information upon which the criteria are based. Therefore, this provision is not considered a WQS subject to EPA review and approval under § 303(c) of the CWA. EPA is therefore taking no action to approve or disapprove the footnote.

C. *EPA Pollutant Identification Numbers and Chemical Abstract Service Numbers*

Oregon's July 8, 2004, WQS submittal included the addition of EPA's pollutant identification numbers and chemical abstract service (CAS) numbers associated with each of the chemical names included in Table 33A. On November 28, 2005 ODEQ submitted a letter outlining four errata changes from their July 8, 2004 submission. Two of these provided CAS numbers for 4-

bromophenyl phenylether and chromium III. These EPA pollutant identification and CAS numbers serve as identifiers for the chemical names of the toxic pollutants.

The provision is not a water quality criterion because it does not establish a legally binding requirement under state law, and it does not describe a desired ambient condition of a waterbody to support a particular designated use. Instead, it only serves informational and identification purposes. Therefore, this provision is not considered a WQS subject to EPA review and approval under § 303(c) of the CWA. EPA is therefore taking no action to approve or disapprove the EPA pollutant identification or CAS numbers.

Appendix A

Review of Oregon's Use of a Fish Consumption Rate of 17.5 Grams Per Day

I-A. INTRODUCTION

EPA's 2000 Methodology recognizes the variability of fish consumption rates among population groups and by geographic region. In employing the Methodology to derive criteria, the Agency urges States and Tribes to use a fish intake level derived from local or regional data in place of the national default recommendation to ensure the fish intake level chosen is protective of highly exposed individuals in the population and to ensure that adequate protection is afforded to all identifiable subpopulations. A four preference hierarchy concerning the use of fish consumption rate data is set forth: (1) use of local data; (2) use of data reflecting similar geography/ population groups; (3) use of data from national surveys; and (4) use of EPA's default intake rate. In using local data, EPA recommends that arithmetic mean values should be the lowest value considered by states when choosing fish consumption rates for use in criteria derivation.[54]

II-A. BACKGROUND

A. *Oregon's Evaluation Process Prior to the July 8, 2004 Submittal*

As part Oregon's decision process associated with adopting the 2004 human health criteria revisions, Oregon evaluated the appropriateness of using EPA's national default fish consumption rate of 17.5 grams per day. The Technical Advisory Committee (TAC), formed to provide guidance to the State on technical issues related to criteria revisions, focused part of its time on "deriving a fish consumption rate appropriate for the protection of Oregon's population." The TAC discussion centered on the availability of technically defensible values for Oregon's general population and for subpopulations within Oregon that are known to be high fish consumers. The TAC agreed that there were no quantitative studies that addressed the general Oregon population; however they found that the 1994 Columbia River Inter-Tribal Fish Commission (CRITFC) Fish Consumption Study[55] did contain good information on fish consumption in a subpopulation with a high fish consumption rate. The TAC initially concluded that 17.5, 64.5, 142.4 and 389.0 grams per day were technically defensible fish consumption

[54] EPA. 2000. *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health*. U.S. Environmental Protection Agency, Office of Water, Washington, D.C. EPA 822-B-00-004. Pages 1-9 to 1-13, 4-24 to 4-25.

[55] CRITFC. 1994. *A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs of the Columbia River Basin.* Columbia River Inter-Tribal Fish Commission, Portland, Oregon. Technical Report 94-3. Available at: http://www.critfc.org/tech/94-3report.pdf.

rates. Upon further consideration, the TAC proposed that fish consumption rates of 17.5, 142.4 and 389.0 be assigned to waters of low, medium and high intensity fish consumption and proposed an intensity level for each waterbody in the state.[56]

When the TAC recommendations were reviewed by Oregon's Policy Advisory Committee (PAC) there was no consensus on use of a single or multiple fish consumption rate(s), the specific fish consumption rate value or the percent of the population that should be targeted when setting the fish consumption rate. ODEQ decided to propose criteria derived using a single fish consumption rate of 17.5 g/day for public comment.[57]

Following review of public comments, ODEQ presented their governing Commission (OEQC) a recommendation that they adopt new and revised human health criteria derived using EPA's 2000 Methodology and a single fish consumption rate of 17.5 g/day. Prior to voting to adopt the 2004 criteria revisions, the OEQC discussed whether a rate of 17.5 grams per day was appropriate for protecting the Oregon public. The Commissioners encouraged ODEQ to seek resources for a more accurate evaluation of fish consumption rates in Oregon.[58] In the July 8, 2004 submittal letter to EPA, ODEQ acknowledged that the fish consumption rate used in deriving their criteria was a source of concern to stakeholders and stated that they would "continue to work with the tribes and other stakeholders to address these concerns."[59]

B. *Oregon's Subsequent Review of Fish Consumption Rates to the July 8, 2004 Submittal*

In 2006, Oregon initiated an extensive review to determine if a fish consumption rate of the 17.5 grams per day was appropriate for use in deriving human health criteria intended to protect the people of Oregon. EPA and the Confederated Tribes of the Umatilla Indian Reservation (Umatilla Tribe) partnered with ODEQ in this review. During this review, Oregon retained their 2004 revisions under state law and did not retract their July 8, 2004 submittal.

As part of this review process, ODEQ formed a Human Health Focus Group (HHFG) comprised of regional experts with experience in the areas of toxicology, risk assessment, public health, biostatistics, and epidemiology. They were tasked with reviewing the available local, regional and national information on fish consumption and making recommendations as to the evidence that should be relied on when selecting a fish consumption rate to use in deriving water quality criteria. The group was also asked to consider how salmon should be considered and to provide

---

[56] ODEQ. 2003. *Toxic Compounds Criteria: 1999-2003 Water Quality Standards Review Issue Paper*. Oregon Department of Environmental Quality, Portland, Oregon. Pages H-35 to H-36. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/may2004/5.20.04.ItemB.AttchH.pdf.
[57] Ibid. Pages H-57 to H-59.
[58] May 20-21, 2004. Oregon Environmental Quality Commission Meeting Minutes. Oregon Department of Environmental Quality. Available at: http://www.oregondeq.com/about/eqc/minutes/2004/5.20-21.04.EQCMinutes.htm.
[59] ODEQ. 2004. Letter dated July 8, 2004, with two attachments, from Stephanie Hallock, Administrator, Oregon Department of Environmental Quality, Portland, Oregon, to John Iani, Administrator, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

an assessment of the extent of risks experienced by consumers who consume higher amounts of fish. The findings and recommendations of the group are provided in report entitled *Human Health Focus Group Report: Oregon Fish and Shellfish Consumption Rate Project* (hereinafter referred to as the "Human Health Focus Group (or HHFG) Report").[60]

EPA has considered the HHFG Report, the finding and recommendation made by ODEQ as a result of this review, and subsequent policy direction from the OEQC in the following review.

C. *Review of Fish Consumption Rate Data*

Regional, national and international studies (Table 1 of HHFG report) indicate that there are a wide range of populations with diverse cultures, traditions, and practices that result in a very broad range of fish consumption patterns. The HHFG found that this variability can be expected in any population of statewide scale and in some cases, similar variability can be seen in much smaller populations.[61]

The HHFG identified eight regional surveys and one national fish consumption survey relevant for developing fish consumption rate(s) for Oregon water quality criteria. These surveys were reviewed in greater detail by the HHFG and discussed in the HHFG Report. The four northwest studies that were found to provide quantitative data of relevance to, and utility for, selecting a fish consumption rate for Oregon are summarized in Table A-5 below.

A survey of Columbia Basin Tribes, *A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs of the Columbia River Basin*[62] was found to be the most relevant to Oregon fish consumers because it made a direct measure of an Oregon population. The survey was funded by EPA and conducted by the Columbia River Inter-Tribal Fish Commission (CRITFC). Interviewed as part of the survey were 513 members of four tribes - two that are located in Oregon (the Confederated Tribes of the Umatilla Indian Reservation (Umatilla Tribe) and the Confederated Tribes of the Warm Springs Indian Reservation (Warm Springs Tribe)), he Nez Perce Tribe located in Idaho and the Confederated Tribes and Bands of the Yakama Indian Nation located in Washington.

Fish consumption rates from this survey representing the mean, 90th percentile, 95th percentile, and 99th percentile were 63, 113, 176, and 389 grams per day, respectively. The survey found that 97 percent of the people interviewed ate fish while 92 percent of those interviewed consumed salmon. All of the fish consumed either spend their entire life or part of their life in Oregon waters and 88 percent of the fish consumed originated from the Columbia River Basin.

---

[60] ODEQ. June 2008. *Human Health Focus Group: Oregon Fish and Shellfish Consumption Rate Project*. Oregon Department of Environmental Quality, Water Quality Division, Portland, Oregon. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/HHFGFinalReportJune2008.pdf.

[61] Ibid. Page 6.

[62] CRITFC. 1994. *A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs of the Columbia River Basin.* Columbia River Inter-Tribal Fish Commission, Portland, Oregon. Technical Report 94-3. Available at: http://www.critfc.org/tech/94-3report.pdf.

Other findings of note from the HHFG review were:

- Surveys of Asian and Pacific Islanders and Eastern European communities in Washington and Oregon also indicate fish consumption at levels similar to the Oregon Tribes.[63]
- A local survey provided qualitative information of subsistence fishers in the Portland metropolitan area,[64]
- Rates from the Tulalip and Squaxin Island Tribes are specifically relevant to Oregon fish-consuming populations, especially the coastal communities. There are places in Oregon such as the Coos, Tillamook and Nehalem Bays that provide habitat similar to the fishing grounds of these tribes. Since the rates reported in that study are comparable to the CRITFC study, it demonstrates a simple relationship between tribal fish-consuming populations in the Pacific Northwest; people eat what's available to them, what's culturally preferred and at high consumption rates.[65]
- The CSFII survey is an extraordinarily large survey with individuals chosen to statistically represent the overall US population. This data set provides a valuable context for Pacific Northwest surveys.[66]
- Fish consumers generally eat a variety of species that are most readily available geographically and seasonally. The ranges of consumption rates among fish consumers tend to be comparable regardless of the species that are available at a given location.[67]
- Two surveys in press in 2008 assessed fish consumption of woman in Japanese and Korean populations in Western Washington and reported fish consumption rates within the range of rates in the other surveys reviewed by the HHFG. These studies provide additional support for Pacific Northwest fish consumption values of relevance for Oregon populations.[68]

D. *Consumers vs. Non-consumers*

The HHFG noted that, in order to protect the fishing use, human health criteria should be established at a level to protect the portion of the population who consume fish from state waters. Thus, they reviewed data relative to consumers (those who eat fish) and to both consumers and non-consumers (those who don't eat fish). The proportion of non-consumers included in the survey varied depending on the population being interviewed. For example, 97 percent of those surveyed in the CRITFC survey were consumers while only 28 percent of those interviewed in the national CSFII survey ate fish.

Oregon's fish consumption rate of 17.5 grams per day was determined on a per-capita basis for

---

[63] ODEQ. June 2008. *Human Health Focus Group: Oregon Fish and Shellfish Consumption Rate Project.* Oregon Department of Environmental Quality, Water Quality Division, Portland, Oregon. Page 8. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/HHFGFinalReportJune2008.pdf.
[64] Ibid. Page 9.
[65] Ibid. Page 10.
[66] Ibid. Page 15.
[67] Ibid. Pages 18-19.
[68] Ibid. Page 30.

the entire US population[69] including fish consumers and non-consumers, with non-consumers recorded as having a consumption rate of 0 g/day. The HHFG recommended that, if it were Oregon's policy choice to specifically protect individuals who consume fish, the rates most appropriate for use in the criteria would be the consumer-only rates.[70]

E. *Pacific Salmon in the Fish Consumption Rate*

EPA's national default fish consumption rates are derived for specific fish habitats (freshwater, estuarine, marine) and designated on a case-by-case basis.[71] The choice of the fish consumption rate to use in deriving criteria can be influenced by what types of fish and shellfish are included in the rate. In determining the national default consumption rate, EPA used commercial landings data provided by National Marine Fisheries Service. Since this data indicated that Pacific salmon were commercially harvested from marine environments, EPA classified Pacific salmon as marine and excluded from the national default consumption rate. However, in EPA's 2000 Human Health Methodology, EPA encouraged states and tribes to make alternative assumptions regarding the inclusion of specific species in the state's fish consumption rate to specifically account for the dietary preferences of the specific population of concern.[72] Oregon requested that the HHFG review the appropriateness of classifying Pacific salmon as a marine species and not including the consumption of Pacific salmon in the rate used by Oregon.

Pacific salmon were consumed by 92% of those interviewed during the CRITFC survey.[73] Pacific salmon and other migratory species present a rather complicated life history for establishing habitat preferences. Pacific salmon reside and pass through waters of the state. They are spawned, incubated and reared in waters of the state, and, after spending time in the ocean, return to Oregon's freshwaters to spawn and die. Additionally, local data reviewed by the HHFG indicate that Pacific salmon are caught in waters of the state (freshwaters and marine waters within 3 nautical miles of shore) in addition to the deep marine water landing data that EPA relied on to classify Pacific salmon for use in the fish consumption rate.[74]

---

[69] USEPA. August 2002. *Estimated per Capita Fish Consumption in the United States.* U.S. Environmental Protection Agency, Washington, DC. EPA 821-C-02-003. Available at: http://www.epa.gov/waterscience/fish/files/consumption_report.pdf.

[70] ODEQ. June 2008. *Human Health Focus Group: Oregon Fish and Shellfish Consumption Rate Project*. Oregon Department of Environmental Quality, Water Quality Division, Portland, Oregon. Pages 17-18. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/HHFGFinalReportJune2008.pdf.

[71] 65 FR 66469. 2000. Federal Register Notice: Revisions to the Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000). Pp. 65 FR 66444-66482.

[72] USEPA. August 2002. *Estimated per Capita Fish Consumption in the United States.* U.S. Environmental Protection Agency, Washington, DC. EPA 821-C-02-003. Available at: http://www.epa.gov/waterscience/fish/files/consumption_report.pdf.

[73] CRITFC. 1994. *A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs of the Columbia River Basin.* Columbia River Inter-Tribal Fish Commission, Portland, Oregon. Technical Report 94-3. Page 33. Available at: http://www.critfc.org/tech/94-3report.pdf.

[74] ODEQ. June 2008. *Human Health Focus Group: Oregon Fish and Shellfish Consumption Rate Project*. Oregon Department of Environmental Quality, Water Quality Division, Portland, Oregon. Pages 20. Available at: http://www.deq.state.or.us/wq/standards/docs/toxics/HHFGFinalReportJune2008.pdf.

Since Pacific salmon are a known part of the diet for fish-consuming populations in Oregon, the HHFG recommended that Oregon's criteria should account for the potential risk incurred from consuming Pacific salmon. Furthermore, they found that including Pacific salmon in the fish consumption rate can provide more scientific certainty that Pacific salmon consumption is accurately accounted for than trying to address it through an estimated Relative Source Contribution value.[75]

F. *Geographic Extent of Tribal Fishing in Oregon*

In 1855, the United States negotiated separate treaties with the four Columbia River Tribes included in the CRITFC survey, including the Umatilla and Warm Springs Tribes. These treaties contained a provision reserving each Tribe's right to take "fish at all usual and accustomed places in common with citizens of the United States." The Columbia River Tribes each reserved the right to take fish: (l) within their respective reservations, (2) at all usual and accustomed fishing sites on lands ceded to the United States government, and (3) at all usual and accustomed fishing sites outside the reservation or ceded areas.[76]

In addition, the United States has entered into treaties or signed executive orders pertaining to the rights of six other tribes located within the boundaries of the state of Oregon. While the form and substance of these other agreements vary, many reserve the right of the tribes and their members to gather fish and/or shellfish. Some of these agreements also reserve the right for tribal members to gather fish and shellfish is waters outside reservation boundaries. The locations of the lands reserved for the Oregon tribes are displayed in Figure A-1 below.

As shown in Figure A-2 below, the ceded lands of the Umatilla and Warm Springs Tribes cover a large portion of northern Oregon. Usual and accustomed sites occur not only within the boundaries of the Umatilla and Warm Springs Tribes' reservations and the ceded lands, but also extend beyond the boundaries of the ceded lands. As such, Figure A-3 below delineates the watershed boundaries (using four-digit hydrologic unit codes) associated with these ceded lands, where additional usual and accustomed fishing sites may exist. Usual and accustomed fishing sites have also been identified within the Willamette River basin and in Oregon's coastal waters.

CRITFC survey participants identified the Columbia River Basin sites shown in Figure A-4 below as locations where they fish. While these sites are scattered throughout much of northern Oregon, the CRITFC survey notes that this map only identifies major fishing sites and does not include all of the usual and accustomed fishing areas utilized by Columbia River Tribes in Oregon. Furthermore, it does not include any of the fishing sites reserved for other tribes under Treaty or federal Executive Order.

Given the above, it is reasonable to conclude that members of CRITFC tribes likely obtain fish

---

[75] Ibid. Pages 25-26.

[76] CRITFC. 1995. *Wy-Kan-Ush-Mi Wa-Kish-Wit: The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes, Volume I.* Columbia River Inter-Tribal Fish Commission, Portland, Oregon. Available at: http://www.critfc.org/oldsite/text/contents.htm.

from sites within the geographical areas represented in Figures A-2, A-3 and A-4. In addition, it is likely that members of other tribes gather fish and shellfish from waters on and near their reservations, including at sites along Oregon's coast.

G. *Location of Other High Fish-Consuming Populations in Oregon*

The Human Health Focus Group identified three high-quality fish consumption surveys conducted in Washington State with relevance to Oregon. They found that the populations surveyed in these studies reflect similar geography and population groups as occur in Oregon. In considering these three surveys and the CRITFC survey, the HHFG found that other Oregon subpopulations are also likely to consume fish at rates at greater than 17.5 grams per day. These include members of other Oregon Tribes and the Asian and Pacific Islander communities.

Population data from the U.S. Census Bureau[77] demonstrate that over twenty percent of Oregon's American Indian/Alaska Native populations live in Oregon's seven coastal counties: Clatsop, Tillamook, Lincoln, Lane, Douglas, Coos, and Curry (refer to Figure A-6 below). These western counties are home to: the Confederated Tribes of Siletz Indians; the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians; and the Confederated Tribes of the Grande Ronde. The HHFG found that the similarities between these Oregon coastal Tribes and the Tulalip, Suquamish, and Squaxin Tribes indicate that these subpopulations in Oregon are likely to consume fish at similar rates.

According to data from the U.S. Census Bureau,[26] Asians and Pacific Islanders reside throughout the State of Oregon. Approximately 73 percent are located within three counties in the Portland metropolitan area: Multnomah, Washington, and Clackamas (refer to Figure A-6 below). The Asian/Pacific Islander survey conducted in King County, Washington, addressed a similar urbanized population in the Pacific Northwest. The HHFG found that the Asian and Pacific Islander subpopulations in Oregon are likely to consume fish at similar rates to those documented in King County.

III-A. SUMMARY OF REVIEW OF OREGON'S FISH CONSUMPTION RATE

The following summarizes the findings from ODEQ's and EPA's review:

- High-quality scientific information on fish consumption rates for an identifiable subpopulation in Oregon (members of the Columbia River Tribes) is available and shows consumption rates higher than 17.5 grams per day.
- A group of regional experts with experience in the areas of toxicology, risk assessment, public health, biostatistics and/or epidemiology have recommended that a fish

[77] U.S. Census Bureau. 2000. *Census 2000 Redistricting Data*. Public Law 94-171. Summary File, Matrices PL1 and PL2. Available at: http://factfinder.census.gov/servlet/GCTTable?_bm=n&_lang=en&mt_name=DEC_2000_PL_U_GCTPL_ST2&format=ST-2&_box_head_nbr=GCT-PL&ds_name=DEC_2000_PL_U&geo_id=04000US41.

consumption rate of 17.5 grams per day is not appropriate for deriving criteria that are protective of Oregonians that eat fish.

- Regional studies indicate that patterns of high fish consumption are also likely to occur in other identifiable subpopulations in Oregon. These subpopulations reside in, and likely fish in, counties located along the Oregon coast and in the Portland metropolitan area.
- Pacific salmon are known to be present in the diet of those who consume fish in Oregon. Pacific salmon are not included in the data used to calculate the national default consumption rate of 17.5 grams per day.
- Much of the fish consumed by the Columbia River Tribes is harvested in Oregon and nearly all the fish reside in Oregon waters for either all or part of their lives.
- The Columbia River Tribes retain rights to fish, and do fish, in waters throughout much of northern Oregon. Other Oregon Tribes have reserved fishing rights in other waters throughout the State.

IV-A. ODEQ'S OCTOBER 23, 2008 RECOMMENDATION AND EQC POLICY DECISION ON AN APPROPRIATE FISH CONSUMPTION RATE TO DERIVE HUMAN HEALTH CRITERIA FOR OREGON

The above findings provided the basis for the State of Oregon to conclude that a fish consumption rate of 17.5 grams per day was not protective of Oregon's higher fish consuming populations. EPA agrees that this is a reasonable conclusion.

In response to this review, ODEQ recommended to their governing Commission that Oregon's human health water quality standards for toxic pollutants be revised to reflect a fish consumption rate of 175 grams per day. In support of their recommendation ODEQ stated that the "recommendation represents a policy decision to protect people in Oregon who traditionally consume large amounts of fish as well those who eat fish for health, economic or other reason, and to set a goal of attaining water quality sufficient to support frequent consumption of fish without undue risk of health effects. Criteria based on a fish consumption rate of 175 g/d would be expected to protect at least 90 to 95 percent of fish consumers in Oregon. The recommended rate includes salmon and lamprey but not marine species or shellfish based on data as analyzed by the CRITFC study. The rate also includes marine species based on the data analyzed by the Puget Sound studies, but at a lower percentile of the population (90 rather than 95%). Salmon are included because they are the primary species eaten by Oregonians and represent a potential path of exposure to toxicants."[78]

Following consideration of ODEQ's recommendation and the testimony from ten stakeholders, the Commission directed ODEQ to pursue rule revisions that will establish new water quality standards for toxic pollutants based upon a revised fish consumption rate.[79]

---

[78] ODEQ. 2008. Memorandum from Dick Pedersen, Director, Oregon Department of Environmental Quality to the Oregon Environmental Quality Commission. October 6, 2008. Agenda Item G. Available at: http://www.deq.state.or.us/about/eqc/agendas/attachments/2008oct/ItemG.pdf

[79] October 23, 2008. Oregon Environmental Quality Commission Meeting Minutes. Oregon Department of Environmental Quality. Available at: http://www.deq.state.or.us/about/eqc/minutes/2008/2008octEQCMinutes.htm.

V-A. FIGURES

A-1. Map of Tribes in Oregon
A-2. Map of Ceded Lands of the CRITFC Tribes
A-3. Map of Watershed Boundaries Associated with Ceded Lands of the CRITFC Tribes
A-4. Map of Fishing Sites Identified as part of the CRITFC Survey
A-5. Table of a Summary of Local and Regional Fish Consumption Surveys and Fish Consumption Rate Data Available to Oregon
A-6. Map of counties in Oregon

Figure A-1: Map of Tribes in Oregon

EPA Region 10 - Oregon
Tribes

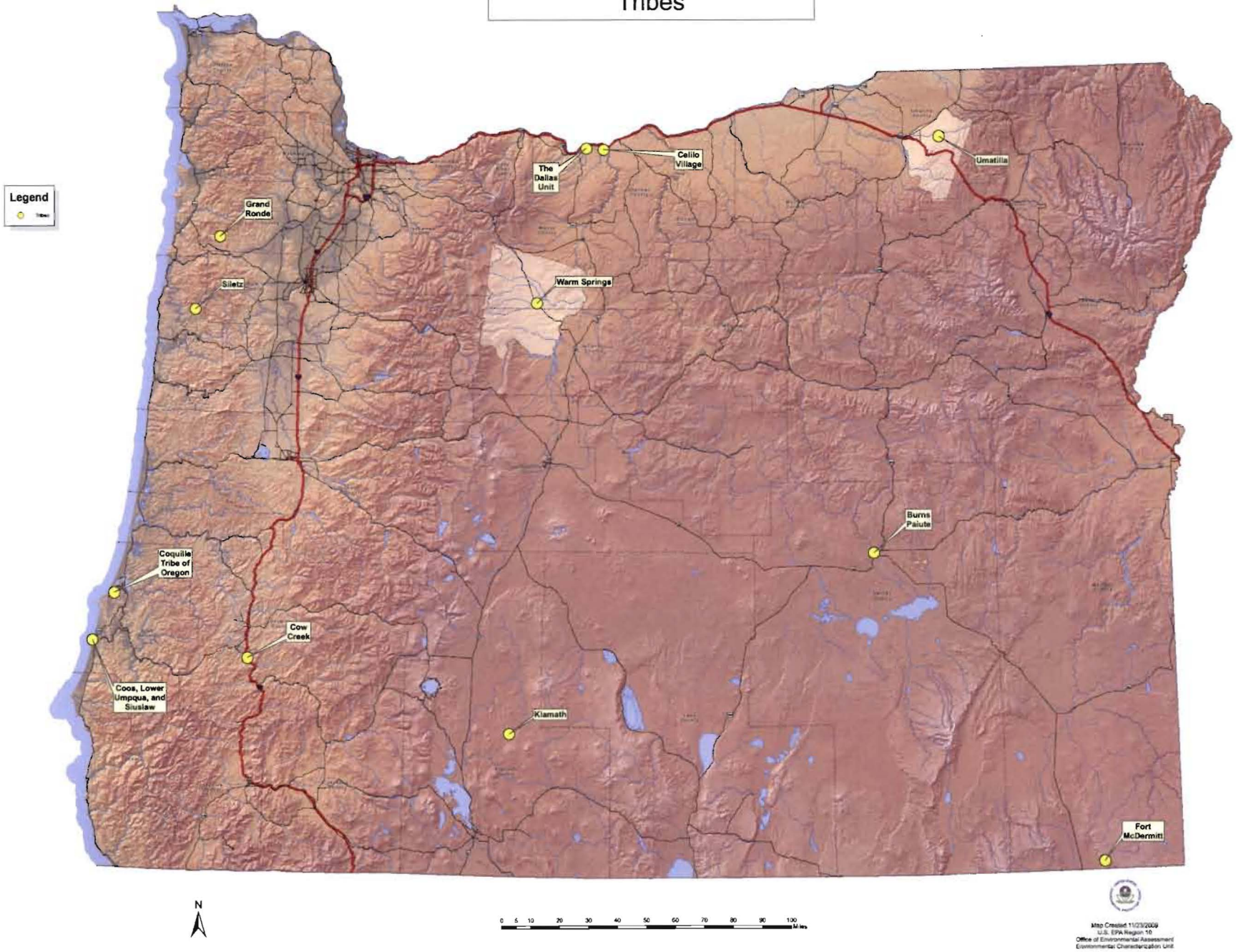


Figure A-2: Map of Ceded Lands of the CRITFC Tribes

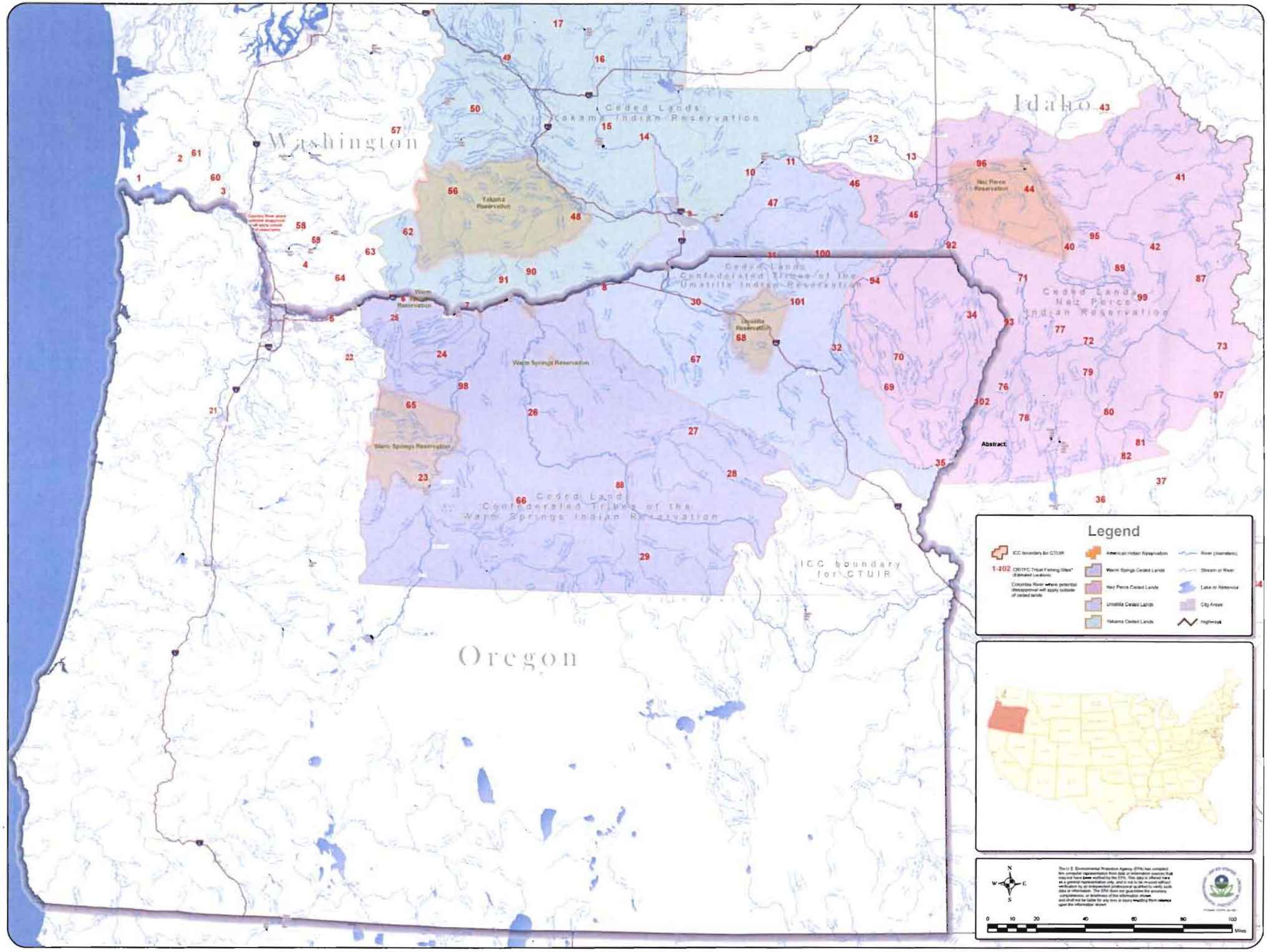

Washington
Idaho
Oregon
Ceded Lands
Yakama Indian Reservation
Yakama Reservation
Nez Perce Reservation
Ceded Lands
Confederated Tribes of the
Umatilla Indian Reservation
Umatilla Reservation
Ceded Lands
Nez Perce
Indian Reservation
Warm Springs Reservation
Ceded Lands
Confederated Tribes of the
Warm Springs Indian Reservation
ICC boundary
for CTUIR
Abstract
Legend
ICC boundary for CTUIR
1-202 CRITFC Tribal Fishing Sites* (Estimated Locations)
Columbia River where potential disapproval will apply outside of ceded lands
American Indian Reservation
Warm Springs Ceded Lands
Nez Perce Ceded Lands
Umatilla Ceded Lands
Yakama Ceded Lands
River (navigable)
Stream or River
Lake or Reservoir
City Areas
Highways
N
W
E
S
0 10 20 40 60 80 100
Miles

Figure A-3: Map of Watershed Boundaries Associated with Ceded Lands of the CRITFC Tribes

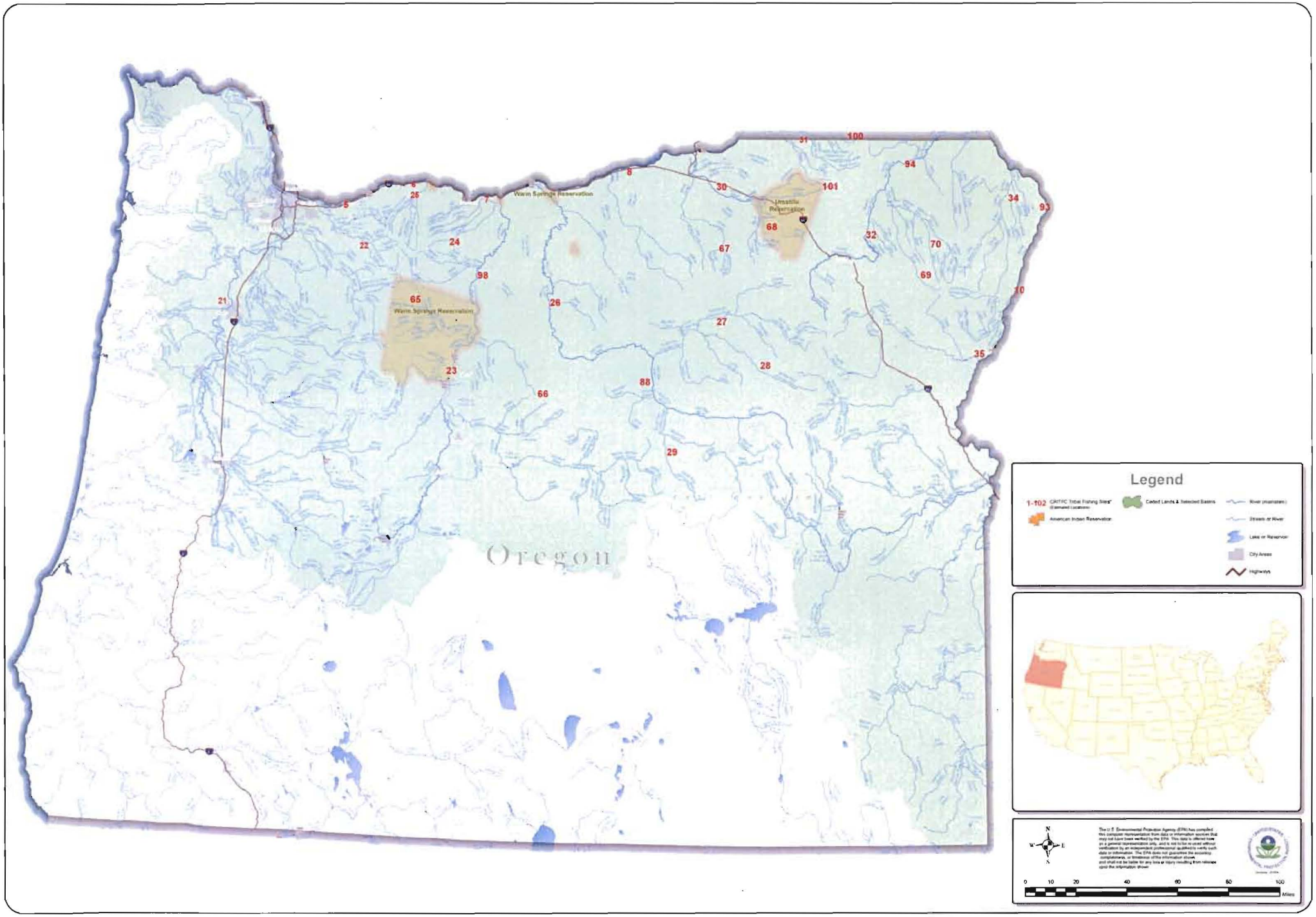

Oregon
Warm Springs Reservation
Umatilla Reservation
Legend
1-102 CRITFC Tribal Fishing Sites* (Estimated Locations)
American Indian Reservation
Ceded Lands & Selected Basins
River (mainstem)
Streams & River
Lake or Reservoir
City Areas
Highways
N
W
E
S
0 10 20 40 60 80 100
Miles

Figure A-4: Map of Fishing Sites in the Columbia River Basin Identified as Part of the CRITFC Survey

(Source: *A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama, and Warm Springs*, previously referenced).

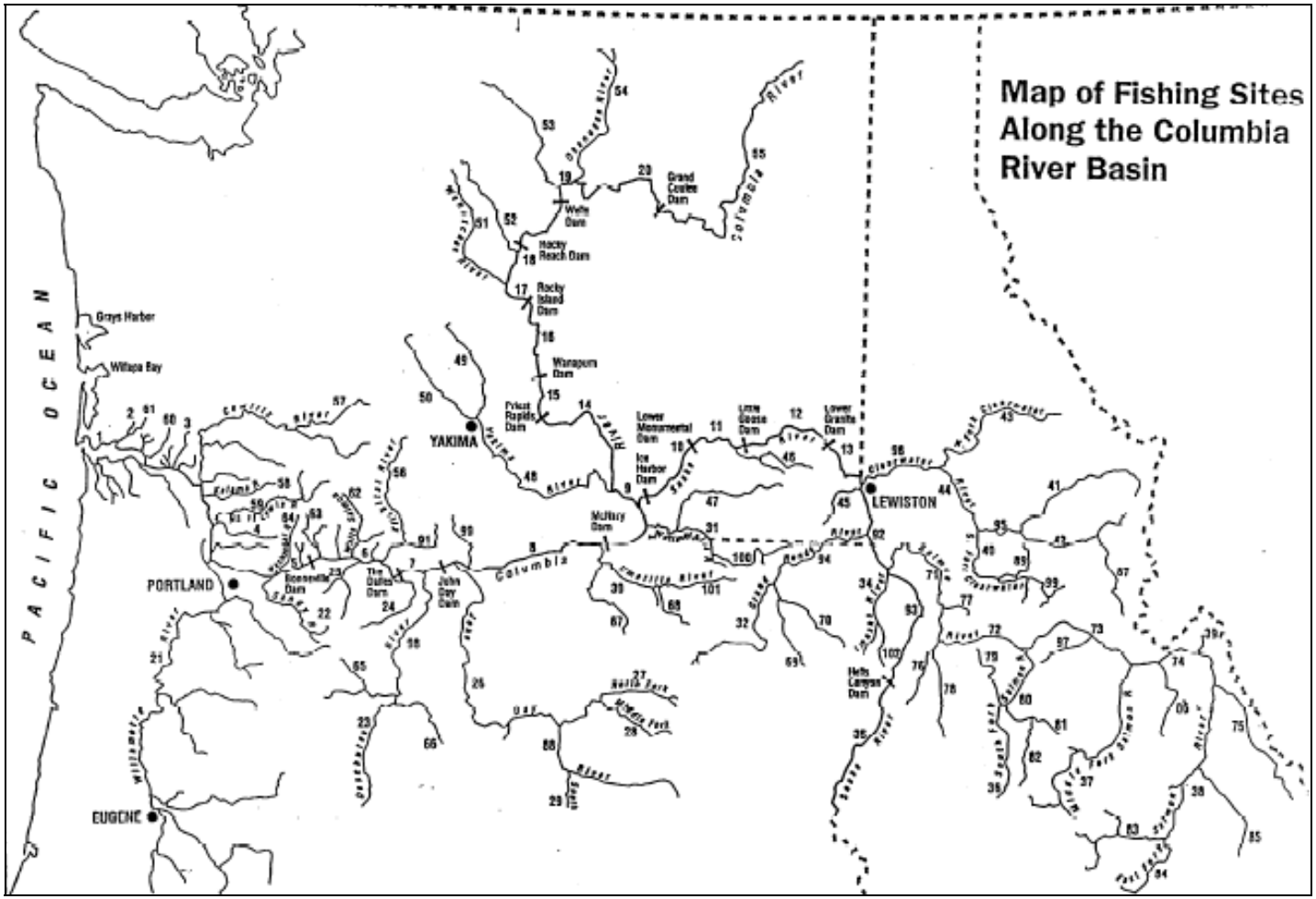
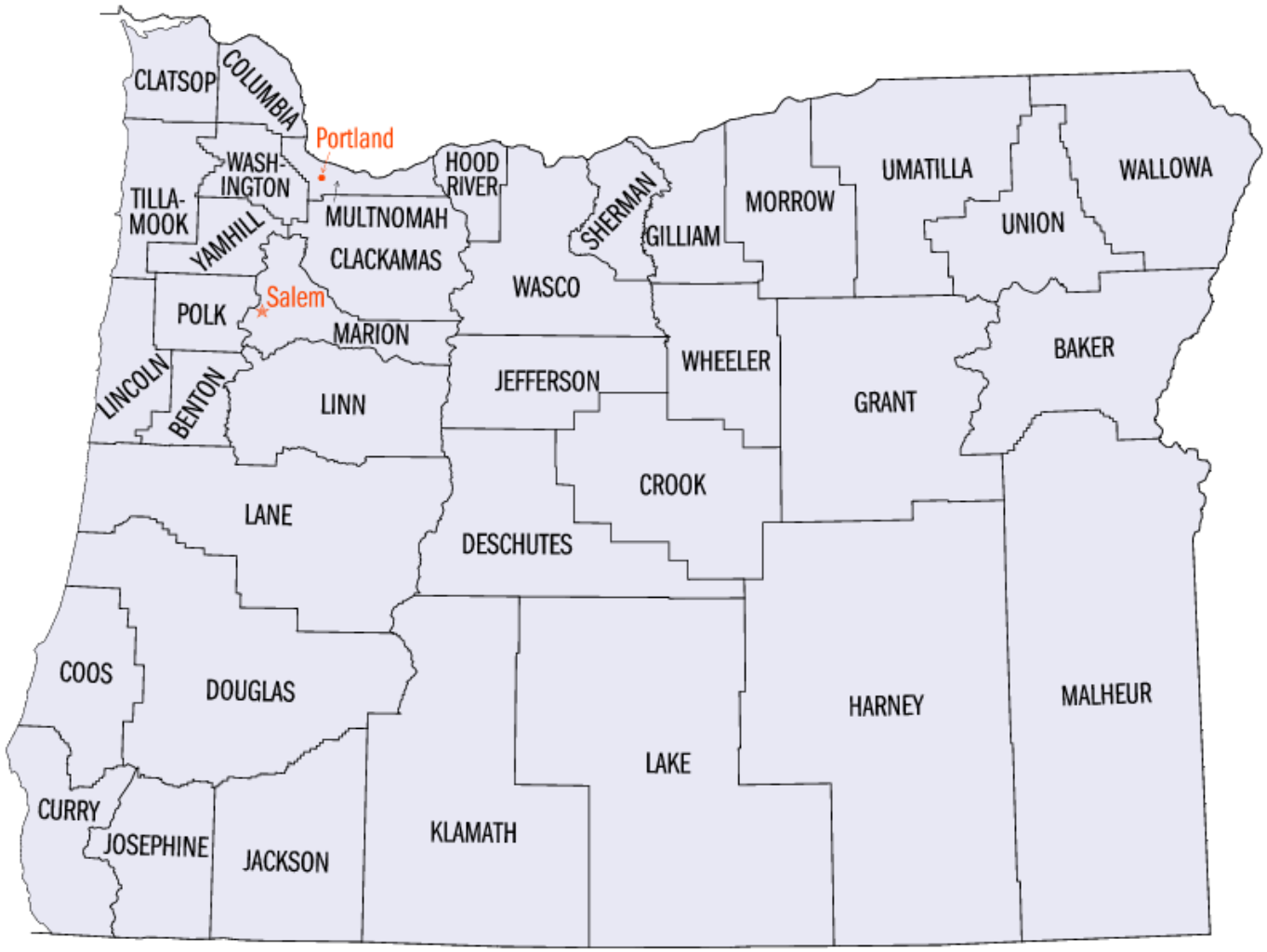


Table A-5: Summary of Local and Regional Fish Consumption Surveys and Fish Consumption Rate Data Available to Oregon

Survey Name	***A Fish Consumption Survey of the Umatilla, Nez Perce, Yakima, and Warm Springs Tribes of the Columbia River Basin (1994)***	***A Fish Consumption Survey of the Tulalip and Squaxin Island Tribes of the Puget Sound Region (1996)***	***Fish Consumption Survey of the Suquamish Indian Tribe of the Port Madison Indian Reservation, Puget Sound Region (2000)***	***Asian & Pacific Islander Seafood Consumption Study in King County, Washington (1999)***
Brief Description of the Survey	Randomly selected members of the Nez Perce, Warm Springs, Yakama, and Umatilla Tribes were interviewed regarding their fish consumption practices, including species of fish consumed, frequency of consumption, preparation methods, and origin of fish consumed. Results weighted by the population of each Tribe were used to develop fish consumption rates and source fraction values used for risk assessment.	Randomly selected members of the Tulalip and Squaxin Island Tribes were interviewed regarding their fish consumption practices, including species consumed, frequency of consumption, preparation methods, and origin of fish consumed. Results were used to develop fish consumption rates and source fraction values used for risk assessment.	Randomly selected members of the Suquamish Tribe were interviewed regarding their fish consumption practices, including species consumed, frequency of consumption, preparation methods, and origin of fish consumed. Results were used to develop fish consumption rates and source fraction values used for risk assessment.	Fish consumption was evaluated for 10 different Asian & Pacific Islander (API) ethnic groups. 50% of participants were volunteers, 50% were recruited from API organizations. Participants were interviewed regarding their fish consumption practices, including species consumed, frequency of consumption, preparation methods, and origin of fish consumed. Results were used to develop fish consumption rates and source fraction values used for risk assessment.
Additional Information Concerning Location and Population Surveyed	This was a fish consumption survey including information on the amount of fish harvested from the Columbia River and its tributaries. 513 adults and 204 children were surveyed. Children were between 0 and 6 years of age. No adolescents were surveyed.	This was a fish consumption survey including information on whether or not adults harvested fish from Puget Sound. 190 adults and 69 children were surveyed. Children were between 0 and 6 years of age. No adolescents were surveyed.	This was a fish consumption survey including information on whether or not adults harvested fish from Puget Sound. 92 adults and 31 children were surveyed. Children were between 0 and 6 years of age. No adolescents were surveyed.	This was a fish consumption survey characterizing fish consumption by Asian Pacific Islanders residing in King County, including information on the quantity of self-harvested fish. 202 adults were surveyed. No children or adolescents were surveyed.

Survey Name	***A Fish Consumption Survey of the Umatilla, Nez Perce, Yakima, and Warm Springs Tribes of the Columbia River Basin (1994)***	***A Fish Consumption Survey of the Tulalip and Squaxin Island Tribes of the Puget Sound Region (1996)***	***Fish Consumption Survey of the Suquamish Indian Tribe of the Port Madison Indian Reservation, Puget Sound Region (2000)***	***Asian & Pacific Islander Seafood Consumption Study in King County, Washington (1999)***
Time Period During Which Survey Data Were Collected	Fall/Winter, 1991-1992	Feb-May 1994	March 1997	Spring-Summer, 1997
Survey Method	Interview/questionnaire	Interview/questionnaire	Interview/questionnaire	Interview/questionnaire
Fish Consumption Rates Derived from Survey[80]				
Mean	63	72 / 73	214	117
Median	40	45 / 43	132	78
75th Percentile	60[81]	85 / N/A[82]	N/A	139
90th Percentile	113	186 / 193	489	236
95th Percentile	176	244 / 247	N/A	306
99th Percentile	389	312 / N/A	N/A	N/A
Fish Species Included in Fish Consumption Rates Identified Above	Anadromous and freshwater finfish	Anadromous and estuarine finfish and shellfish	Anadromous and estuarine finfish and shellfish	Anadromous and estuarine finfish and shellfish

[80] Fish consumption rates provided for adults population. Adults are 18 years or older for all surveys except Suquamish; Suquamish adults were 16 years or older. Note that the Human Health Focus Group reported cited above states that "the adult levels should generally be protective of children."
[81] The 75, 90, 95 and, 99th percentiles are interpolated from percentiles reported in the CRITFC study.
[82] "N/A" means "Statistical value not available."

Figure A-6: Map of Counties in Oregon

(Source: *U.S. Census Bureau, 2000* previously referenced).