DEPARTMENT OF ECOLOGY
State of Washington

Water Quality Program Policy

Chapter I ***WQP Policy I-II***

References: Federal Clean Water Act
Section 303(d)
[33 USC-1313(d)]
40-CFR-25
40-CFR-130
40-CFR-131
Chapter 173-201A-WAC
Chapter 173-204-WAC

Revised: ~~July 2012~~February 2018

The Department of Ecology is proposing revisions to WQP Policy 1-11, Chapter 1, *"Assessment of Water Quality for the Clean Water Act Section 303*d) and 305(b) Integrated Report."*

For purposes of review, Ecology has created two versions of the proposed revisions:

1. An underline/strikeout version to enable the reader to see what has changed using the current format.
2. A clean version that is easier to read and is viewed in publication format.

This version represents the underline/strikeout version of Policy 1-11 Chapter 1.

To assist the reader, the following examples describe how changes are viewed in this document.

New language that has been added will show up as red underlined.

Deleted language will show up as ~~red strikeout~~.

Language that is being moved to another location will show up as ~~green strikeout~~.

Language that has been moved to new location and not edited will show up as green underlined. Where appropriate, [PURPLE BRACKET] are used after section heads to describe changes to the section to help orient the reader. We note that, due to the differences in formatting between the 2012 version and the proposed draft version, there may be some inconsistent formatting in this underline/strikeout version.

Assessment of Water Quality for the Clean Water Act Section 303(d) and 305(b) Integrated Report

Purpose: The Washington Department of Ecology (Ecology) periodically assesses the water quality status of state waterbodies and develops the Washington Water Quality Assessment (WQA). The purpose of the WQA is to determine the status of water quality in Washington State (State) based on a comparison of the available monitoring data to the surface water quality standards (Chapter 173-201A WAC) and sediment management standards (Chapter 173-204 WAC). This policy describes the methodologies for how ~~waterbody segments~~AUs (called assessment units, or AU) will generally be assessed to determine attainment ~~with Chapter 173-201A-WAC (surface water quality standards) and Chapter 173-204-WAC (sediment management standards) and~~ of the state standards and then placed in ~~various~~one of five categories ~~based on this determination. These~~, ranging from waters that meet tested standards (Category 1) to polluted waters (Category 5). The different categories described in this WQA policy identify the status of the ~~waterbody segment~~AU and ~~denote~~may signify future ~~regulatory~~ actions~~. This policy also provides specification for data submittal and data quality necessary~~ needed to improve or protect water quality. Only one category, Category 5, represents the 303(d)-listed waters required by the CWA. The criteria for ~~inclusion in the assessment.~~the 303(d) list were developed to identify only those waters for which there is credible evidence of impairment to designated uses. This policy, in combination with the guidance documents referenced herein, constitute the ~~"Listing Methodology" for the Integrated Report composed of the~~ listing methodology used to fulfill the federal Clean Water Act (CWA) Section 303(d) list and 305(b) ~~report as required by the federal Clean Water Act (CWA) and the U.S. Environmental Protection Agency (EPA).~~reporting requirements.

Application: This policy applies to ~~Department of~~ Ecology ~~(Ecology)~~ staff when ~~conducting assessments~~evaluating data and information for the ~~Integrated Report~~WQA to satisfy federal CWA requirements ~~and to prioritize Total Maximum Daily Load (TMDL) efforts.~~. It is also intended as guidance for all parties submitting data for the ~~assessment~~WQA process or ~~developing~~planning data collection ~~programs~~efforts for use in future ~~assessments~~WQAs.

Table of Contents: [PAGE NUMBERS NOT INCLUDED IN THIS VERSION]

Approval [MOVED FROM END OF DOCUMENT]

Approved: _____

Heather Bartlett Date
Program Manager
Water Quality Program
Department of Ecology

Approved: _____

Carol Smith Date
Program Manager
Environmental Assessment Program
Department of Ecology

Abbreviations, Acronyms, and Definitions [MOVED FROM END OF DOCUMENT & EDITED]

303(d)	Clean Water Act Section 303(d)
305(b)	Clean Water Act Section 305(b)
AU	Assessment Unit, defines waterbody segment
B-IBI	Benthic Index of Biological Integrity
CAP	Cleanup Action Plan
CERCLA	Comprehensive Environmental Response Compensation and Liability Act (also known as Superfund)
CFR	Code of Federal Regulations
CM	Correction Measure
CWA	Clean Water Act
DWEC	Drinking Water Exposure Concentration
$DWEC_N$	Drinking Water Exposure Concentration for non-carcinogenic effects
$DWEC_C$	Drinking Water Exposure Concentration for carcinogenic effects
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EAP	Environmental Assessment Program
EIM	Environmental Information Management (Ecology database)
EPA	U.S. Environmental Protection Agency
MTCA	Model Toxic Control Act
MCL	Maximum Contaminant Levels
MDL	Method Detection Limit
mg/L; mg/kg	Milligrams per Liter; Milligrams per kilogram
mg/kg	Milligrams per kilogram
mL	Milliliters
ng/L; ng/kg	Nanograms per Liter; Nanograms per kilogram
NTR	National Toxics Rule
NHD	National Hydrography Dataset
NTU	Nephelometric Turbidity Unit
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
pg/L; pg/kg	Picograms per Liter; Picograms per kilogram
ppm	Parts per Million
ppb	Parts per Billion
ppq	Parts per Quadrillion (same as pg/kg or pg/L)
PQL	Practical Quantitation Limit

QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCW	Revised Code of Washington
RIVPACS	River Invertebrate Prediction and Classification System
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SIZmax	Sediment Impact Zone maximum
SMS	Sediment Management Standards
SOP	Standard Operating Procedure
SQS	Sediment Quality Standards
State	Washington State
TCDD	Tetrachlorodibenzoparadioxin (dioxin)
TCP	Toxics Cleanup Program
TEC	Tissue Exposure Concentration
TEC_N	Tissue Exposure Concentration for non-carcinogenic effects
TEC_C	Tissue Exposure Concentration for carcinogenic effects
TEF	Toxicity Equivalent Factor
TEQ	Toxic Equivalents
TMDL	Total Maximum Daily Load
*u*g/L; ug/kg	Micrograms per Kilogram, Micrograms per Liter
USGS	United States Geological Survey
WAC	Washington Administrative Code
WQA	Water Quality Assessment

DEFINITIONS

The following terms are defined to aid in the interpretation of the text:

303(d) List	**Clean Water Act Section 303(d) requires that States provide a list of waters not meeting water quality standards**
305(b) Report	Clean Water Act Section 305(b) requires that States provide a biennial report to Congress of the water quality status of state waterbodies.
7-DADMax	Mean value of the maximum daily temperatures in a consecutive 7-day period
7Q10 High Flow	Seven-day, consecutive high flow with a ten year return frequency; the highest stream flow for seven consecutive days that would be expected to occur once in ten years

7Q10 Low Flow	Seven-day, consecutive low flow with a ten year return frequency; the lowest stream flow for seven consecutive days that would be expected to occur once in ten years
Assessment Unit (AU)	A waterbody segment or portion of a waterbody segment from which data is evaluated to determine compliance with water quality standards. Assessment units are typically delineated using the NHD reaches for fresh waters or grids for open waterbodies. AUs are the basis for waterbody listings.
BioPoints	The number of points assigned to an individual BioStation based upon the number of bioassay exceedances (maximum 3 bioassays per station) and the severity of the bioassay exceedance (SQS/SIZmax). If greater than three BioStations exist in a quarter grid, the BioStations with the highest exceedances are used.
BioScore	The total number of points assigned to a quarter grid resulting from the summation of the BioPoints from the three stations with the most recent collection/evaluation date.
BioStation	A location (i.e., station) within a quarter grid where a sediment sample was obtained and tested for using an Ecology designated biological test.
Call-for-data	Window of time that data is being assessed for the listing cycle.
ChemPoints	The number of points assigned to an individual ChemStation based upon the number of chemical exceedances and the severity of the chemical exceedance (SQS/SIZmax) at that station. If greater than three ChemStations exist in a quarter grid, the three ChemStations with the most recent date and highest exceedances are used. This is performed for all 47 SMS chemicals at each ChemStation.
ChemScore	The total number of points assigned to a quarter grid resulting from the summation of the ChemPoints from the three stations with the most recent collection/evaluation date and the highest chemical values for each of the 47 SMS chemicals.
ChemStation	A location (i.e., station) within a quarter grid where a sediment sample was obtained and tested for chemical constituents using Ecology designated procedures.
Continuous monitoring	Sampling regime that records a series of parameter values at a defined frequency.

Data validation	An analyte-specific and sample-specific process that extends the evaluation of data beyond data verification to determine the usability of a specific data set. It involves a detailed examination of the data package, using both professional judgment, and objective criteria, to determine whether the method quality objectives for precision, bias, and sensitivity have been met. It may also include an assessment of completeness, representativeness, comparability and integrity, as these criteria relate to the usability of the dataset.
Data verification	Examination of a dataset for errors or omissions, and assessment of the Data Quality Indicators related to that dataset for compliance with acceptance method quality objectives.
Designated Use	Designated uses of WA state waterbodies include Aesthetics, Agricultural, Aquatic Life, Boating, Commerce & Navigation, Domestic Water Supply, Fish & Shellfish Harvest, Industrial, Recreation, Stock Water, and Wildlife Habitat.
Exceedance	A pollutant result value that is greater than, or outside of the acceptable range of, a water quality standard criteria.
Excursion	A pollutant result value that is above or below water quality criteria expressed as an acceptable range.
Grid	Defines an assessment unit in marine waters, lakes of more than 1,500 acres, and estuarine areas (the lower end) of some large rivers. Assessment units for gridded waterbodies are defined by a rectangular grid sized at 45 seconds latitude by 45 seconds longitude (approximately 2,460 feet by 3,660 feet). Contaminated sediment site listing segments are assigned to the appropriate quarter grid section of a full size rectangular grid (dividing the 2,460 feet by 3,660 feet grid into quarter sections).
Impairment	Occurs when a designated use of a waterbody is not supported; this occurs when water quality standards are not persistently met.
Integrated Report	A report composed of the Section 303(d) list and 305(b) report as required by the federal Clean Water Act (CWA) and the U.S. Environmental Protection Agency (EPA).
Listing	An evaluation of data and information compared to the water quality standards to determine the appropriate category for an individual AU/medium/parameter combination.
Listing cycle	The timeframe and process of issuing the call-for-data and then assessing the data in preparation of the Washington Water Quality

	Assessment to meet Clean Water Act requirements in sections 303(d) and 305(b).
National Hydrography Dataset (NHD)	The National Hydrography Dataset (NHD) is a digital database of surface water features used to make maps. It contains features such as lakes, ponds, streams, rivers, canals, dams and stream gages for the United States at the 1:24,000 scale or better.
TMDL Boundary	The perimeter that encompasses an area wherein a TMDL project applies and wherein implementation actions must occur to meet the goals and objectives of that TMDL.
Water Quality Assessment	A statewide status report on the water quality of WA state waterbodies. Used to satisfy CWA §303(d) and §305(b) requirements.
Water Quality Standards	Water quality standards consist of numeric criteria, narrative criteria, and antidegradation components. The combination of these components express the water quality conditions necessary for supporting the state designated uses of a waterbody.
Waters of the State	Waters of the State are defined in RCW 90.48, "*Water Pollution Control*." to include lakes, rivers, ponds, streams, inland waters, saltwaters, and all other surface waters and water courses within the jurisdiction of the State of Washington.

PART 1: General Assessment Considerations

1A. Introduction and Background

The Washington Department of Ecology (Ecology) periodically assesses the water quality status of WA state waters and develops the Washington Water Quality Assessment (WQA). The purpose of the ~~assessment~~WQA is to determine the status of water quality in Washington State (State) based on a comparison of the ~~review of~~ available monitoring data ~~for compliance with~~to the surface water quality standards (Chapter 173-201A WAC) and sediment management standards (Chapter 173-~~201A WAC and Chapter 173-204 WAC). The State is required, under~~204 WAC). This policy describes the methodologies for how AUs (called assessment units, or AU) will generally be assessed to determine attainment of the state standards and then placed in one of five categories, ranging from waters that meet tested standards (Category 1) to polluted waters (Category 5). This policy, in combination with the guidance documents referenced herein, constitute the listing methodology used to fulfill the federal Clean Water Act (CWA) Section 303(d) ~~of the CWA and the EPA's implementing regulations (40 CFR 130.7), to periodically prepare a~~ list ~~of water quality limited segments as determined through the use of the state's water quality standards. In Washington,~~ and 305(b) reporting requirements. Development of this ~~list is prepared by Ecology. The State is also directed to periodically submit other information~~policy document was largely in accordance with ~~Section 305(b) of the~~ directed in part by EPA's Integrated Reporting Guidance.

The different categories described in this WQA policy identify the status of the AU and may signify future actions needed to improve or protect water quality. Only one category, Category 5, represents the 303(d) list of impaired waters required by the CWA. ~~The process of issuing the call for data and then assessing the data in preparation of the list is called the "listing cycle."~~The criteria for the 303(d) list were developed to identify only those waters for which there is credible evidence that water quality standards are not being persistently attained.

The surface water quality standards to be used for the ~~assessment~~WQA process are in Chapter 173-201A WAC, ~~*Water Quality Standards for Surface Waters of the State of Washington;* see apps.leg.wa.gov/WAC/default.aspx?cite=173-201A and the federal National Toxic Rule (NTR) and Human Health Criteria in 40 CFR Part~~ *Water Quality Standards for Surface Waters of the State of Washington* and federally promulgated criteria at 40 CFR 131~~ (Federal Register Vol. 57, No. 246, and as updated).~~.45. For ~~contaminated~~ sediments, the standards are in Chapter 173-204 WAC, ~~*Sediment Management Standards*; see apps.leg.wa.gov/WAC/default.aspx?cite=173-204.~~*Sediment Management Standards*, parts I – IV.

~~Data~~ In accordance with the Water Quality Data Act (WQDA) codified in RCW 90.48.570 through 90.48.590, data submitted must include verification of appropriate ~~Quality Assurance/Quality Control~~quality assurance/quality control (QA/QC) to be considered in the ~~assessment~~WQA. See ~~Section 4 and the "Water Quality Data Act Policy"~~other sections of this policy for more information on meeting credible data requirements.

~~The information and guidance in this policy have been developed to guide the assignment of waters into one of five categories. All waters in the State, where water quality data or information are available, will be assessed and placed into one of the categories.~~

~~Only one category, Category 5, represents the 303(d)-listed waters. The criteria for the 303(d) list were developed to identify only those waters for which there is valid documentation of impairment. These waters~~Ecology designates an impairment when the waterbody does not consistently meet water quality standards for the designated use. To evaluate whether or not criteria are persistently being met, Ecology considers magnitude, frequency, and/or duration of the exceedance of the water quality standard.

Waters identified as impaired and placed in Category 5 require the preparation of ~~water quality improvement projects, also known as TMDLs,~~a total maximum daily load (TMDL), in accordance with the CWA. ~~Waters showing apparent exceedances of criteria due to documented natural background conditions, and with no significant human contribution, will not be listed in Category 5 but will be placed in Category 1.~~ Some impaired waters will not be listed in Category 5 because a TMDL is not required or has already been developed (see Category 4). As part of the listing process, waters placed in Category 5 will be prioritized and scheduled for TMDL studies. or other methods to address the impairment, in accordance with the ~~watershed schedule~~prioritization outlined in ~~Section 9~~Part 1H.

The remaining categories (Categories 1 through 4, including three subcategories of Category 4) meet the intent of section 305(b) of the CWA and are intended ~~to inform other water quality efforts in the State, and~~ to inform the public about the known condition of the State's waters. A summary of the 5 categories is shown in ~~Table 1.~~the following table:

~~Table 1. The Water Quality Assessment Categories.~~

Category 1. ~~Segment~~AU Meets Tested Criteria	Not ~~known to be~~considered impaired
Category 2. ~~Segment~~AU is a Waters of Concern	
Category 3. ~~Segment~~AU Lacks Sufficient Data	
Category 4. ~~Segment~~AU Impaired But Does Not Require A TMDL because ~~4a. Segment~~4A. AU Has a TMDL Approved by EPA *or* ~~4b. Segment~~4B. AU Has a Pollution Control Program *or* ~~4c. Segment~~4C. AU Impaired by a Non-Pollutant	Impaired
Category 5. ~~Segment~~AU is on 303(d) List	

~~The draft results of all five water quality assessment categories will be made available for public review and submitted to EPA, but only Category 5, submitted as the candidate 303(d) list, is subject to EPA approval. EPA has authority to disapprove the Category 5 list and to propose the addition and removal of waters to and from Category 5. These subsequent actions are also subject to public review. TMDLs are also approved by EPA through a separate action, thus listings on Category 5 that are part of an approved TMDL will be moved to Category 4a.~~ More detailed descriptions of the five Categories can be found in Part 1G.

1B. Process to Develop Water Quality Assessment [NEW SECTION]

For each WQA, water quality parameters will be assessed and categorized into one of the five categories. The draft results will be made available for public review and commented, followed by submittal to EPA. Only Category 5, submitted as the candidate 303(d) list, is subject to EPA approval. EPA has authority to disapprove the Category 5 list and to propose the addition of waters to Category 5. These subsequent actions by EPA are also subject to public review. TMDLs are approved by EPA through a separate action. Category 5 listings that are associated with an EPA-approved TMDL will be moved to Category 4A.

Listing Cycles and Call-for-Data

The CWA requires states to report on sections 303(d) and 305(b) every two years. Federal regulations at 40 CFR section 130.7(b)(5) requires that "Each State shall assemble and evaluate all existing and readily available water quality related data and information to develop the list." EPA guidance describes the types of data and information that should be considered, and also encourages states to solicit from a wide variety of public, private, and academic organizations and individuals. EPA also advises that if the state has specifications for data and information, these specifications should be included in any requests for information.

Public Participation

Each WQA will have a public call-for-data to solicit existing and readily available data. The call-for-data for each listing cycle will be announced through the WQA website and water quality email listserv, and will request credible data and information that was collected during the WQA data window. Results of the WQA will then be announced for public review and comment prior to submitting the WQA and candidate 303(d) list to EPA.

Data collected in recent years (within the time frames specified in the call-for-data) may be submitted for consideration in the WQA. Data submitted for use in prior assessments should not be resubmitted.

Individuals and organizations can participate in development of the WQA in any of the following ways:

- Review and comment on the listing policy and methodology during public comment periods.
- Data can be submitted at any time to Ecology's EIM database for use in a subsequent assessment cycle. Water quality data and information can also be submitted during the public "call-for-data" period for a specific WQA cycle.
- Review and comment on Ecology's proposed 303(d) list and other WQA categories.
- Review and comment on the annual TMDL prioritization process (see Part 1H).
- After Ecology submits the updated WQA and Candidate 303(d) list to EPA for approval, submit any further comments to EPA for consideration on their approval process.

- If EPA disapproves or partially disapproves the candidate 303(d) list, then review and comment on EPA's actions.

Coordination with Tribes and Other States [THIS SECTION MOVED AND EDITED]
In accordance with the Centennial Accord~~, this policy supports intergovernmental cooperation~~ established between the State and adjacent federally recognized tribes~~-~~, this policy supports intergovernmental cooperation during development of the State's 303(d) list. The policy relies on the agreement described in the 1997 *Cooperative Management of the Clean Water Act 303(d) Program for the Tribes in Washington State, the Washington State Department of Ecology, and the U.S. Environmental Protection Agency Region 10*.

Tribes have independent authority for setting water quality standards and implementing regulations ~~for waters on reservation lands under the CWA. The State is bound under the Supremacy Clause of the United States Constitution, article VI; c1.2, to carry out the provisions of the United States Treaties and relevant federal court rulings. Thus~~under the CWA for waters on reservation lands. Therefore, Ecology's 303(d) list will not address on-reservation waters. This policy does not nor is it intended to enlarge, diminish, or define the jurisdiction of the State or the tribes, nor does this policy limit the right of the State or any tribe to act in other forums to protect their rights.

~~The states of Oregon and Idaho also share jurisdiction over water quality in waters that flow through or are located between neighbor states. Although water quality standards and criteria may differ, coordination of listing decisions for shared waters will be evaluated during the assessment for the report.~~

~~Ecology staff will provide an opportunity to confer on a government-to-government basis with each interested tribe with affected natural resources and also with neighboring states during the following steps in the development of the State's Water Quality Assessment (Assessment) and 303(d) list:~~

- ~~Policy development and revisions.~~
- ~~Preparation of draft and final Assessments.~~
- ~~Responsiveness summaries.~~

Occasionally, data are submitted to Ecology about water quality of waters on reservation lands and waters of neighboring states. Ecology will receive this information, but will not make listing decisions for such waters. ~~Ecology's intent is to make listing decisions by mutual agreement through timely sharing of information, clarification, and discussion.~~ The State and each individual tribe are responsible for making their own final listing recommendations to EPA within their respective 303(d) programs.

The States of Oregon and Idaho also share jurisdiction over water quality in waters that flow across state lines or form state boundaries. Although water quality standards and criteria may differ, coordination of listing decisions for shared waters will be evaluated during the WQA.

Ecology staff will offer to confer with each interested tribe and also with neighboring states during the development of the WQA and 303(d) list, including policy development and revisions, and preparation of draft and final WQAs.

~~2~~1C. Waterbody Segments and GIS Layers

~~Water bodies~~Waterbodies covered by this policy include all waters of the state. Waters of the state are defined in RCW 90.48, "*Water Pollution Control*" to include "lakes, rivers, ponds, streams, ~~lakes, Puget Sound, the Strait of Juan de Fuca, coastal waters, waterways~~inland waters, salt waters, and all other surface waters ~~subject to the regulatory authority of Ecology according to RCW 90.48, "*Water Pollution Control*."~~and water courses within the jurisdiction of the state of Washington."

As part of the ~~assessment~~WQA process, ~~a waterbody segmentation system must be identified for accurately reporting the extent or size of the water body based on the data assessed. The State's history of reporting~~Ecology delineates waterbody segments ~~has varied in past reporting cycles. In the 1998 through 2008 assessments, Ecology reported the majority of waterbody segments of~~ by assessment units (AU) as follows.

In fresh waters: The 1:24,000 scale National Hydrography Dataset (NHD) is used to delineate AUs for fresh water rivers, streams~~,~~ and lakes ~~as the portion of the water body lying within a given section of a township and range.~~ less than 1500 acres. This establishes AUs based on a confluence-to-confluence type hydrologic system.

In open waters~~ including~~: A gridded system is used to delineate AUs for marine waters, lakes of more than 1,500 acres, and estuarine areas (the lower end) of some large rivers~~ segments~~. Assessment units for marine waterbody are defined by a rectangular grid sized at 45 seconds ~~longitude~~latitude by 45 seconds ~~latitude~~longitude (approximately 2,460 feet by 3,660 feet). Contaminated sediment site ~~listings~~ listing segments are assigned to the appropriate quarter grid section of a full size rectangular grid~~.~~ (dividing the 2,460 feet by 3,660 feet grid into quarter sections).

~~When data are collected, they are reported as being taken from a specific location known as the sampling station. The best way to describe the location of a sampling station is by latitude and longitude. These coordinates allow Ecology to apply the collected data to future and past water segmentation schemes.~~

~~To promote national consistency in accurate measurement and reporting, EPA has recommended that states use the National Hydrography Dataset (NHD) for segmentation of rivers and streams. Starting with the 2012 Water Quality Assessment for freshwater, Ecology is moving to a segmentation system based on the NHD at the 1:24,000 scale. The conversion to the NHD segments may cause different assessment results for a given water body.~~

Water Quality Atlas

Ecology maintains an interactive mapping system called the Water Quality Atlas. This Atlas contains GIS layers for both marine and fresh waters, representing the surface water quality standards, assessed waters and sediments from the WQA database, permits and outfall information, and TMDLs. The Water Quality Atlas may be accessed at

https://fortress.wa.gov/ecy/waterqualityatlas/StartPage.asp or through specific listings in the WQA Search Tool at: https://fortress.wa.gov/ecy/approvedwqa/ApprovedSearch.aspx.

~~3. Coordination with Tribes and Other States~~ [THIS SECTION MOVED TO 1B & EDITED]

~~In accordance with the Centennial Accord, this policy supports intergovernmental cooperation between the State and adjacent federally recognized tribes during development of the State's 303(d) list. The policy relies on the 1997 *Cooperative Management of the Clean Water Act 303(d) Program for the Tribes in Washington State, the Washington State Department of Ecology, and the U.S. Environmental Protection Agency Region 10*.~~

~~Tribes have independent authority for setting water quality standards and implementing regulations for waters on reservation lands under the CWA. The State is bound under the Supremacy Clause of the United States Constitution, article VI; c1.2, to carry out the provisions of the United States Treaties and relevant federal court rulings. Thus, Ecology's 303(d) list will not address on-reservation waters. This policy does not nor is it intended to enlarge, diminish, or define the jurisdiction of the State or the tribes, nor does this policy limit the right of the State or any tribe to act in other forums to protect their rights.~~

~~The states of Oregon and Idaho also share jurisdiction over water quality in waters that flow through or are located between neighbor states. Although water quality standards and criteria may differ, coordination of listing decisions for shared waters will be evaluated during the assessment for the report.~~

~~Ecology staff will provide an opportunity to confer on a government-to-government basis with each interested tribe with affected natural resources and also with neighboring states during the following steps in the development of the State's Water Quality Assessment (Assessment) and 303(d) list:~~

- ~~Policy development and revisions.~~
- ~~Preparation of draft and final Assessments.~~
- ~~Responsiveness summaries.~~

~~Occasionally, data are submitted to Ecology about water quality of waters on reservation lands and waters of neighboring states. Ecology will receive this information, but will not make listing decisions for such waters. Ecology's intent is to make listing decisions by mutual agreement through timely sharing of information, clarification, and discussion. The State and each individual tribe are responsible for making their own final listing recommendations to EPA within their respective 303(d) programs.~~

~~4. Public Participation and Submitting Information~~ [THIS SECTION MOVED TO 1B and EDITED]

~~Individuals and organizations can participate in the Assessment, 303(d) listing, and TMDL process in any of the following ways:~~

- ~~Review and comment on this listing policy and methodology.~~
- ~~Submit water quality data for the assessment at any time and during the "call for data" period.~~
- ~~Review and comment on Ecology's proposed 303(d) list and other assessment categories.~~
- ~~If EPA disapproves of the proposed 303(d) list or proposes changes, then review and comment on EPA's actions.~~

~~Listing cycles and call for data~~ [THIS SECTION MOVED TO 1B & EDITED]

~~In accordance with the CWA requirements for sections 303(d) and 305(b), Ecology will conduct biennial assessments of readily available water quality data to the maximum degree feasible. Any deviation from the statewide biennial Assessment, such as focusing on a specific part of the state, will be done with adequate public notice.~~

~~Each biennial assessment will have a public "call for data" to ensure that Ecology obtains all readily available data. The "call for data" for each listing cycle will be announced through the program website and email listservs, and will be open between February 1- April 1 of the calendar year corresponding to the listing cycle. Thus, starting in 2014 a call for water quality data will occur between February 1 and April 1, 2014. This timing will allow data and information that was collected through the 2013 calendar year to be submitted for use in the 2014 Assessment. If a submitter's data should be assessed on the water year (October through September), data should only be submitted through September. Results of the Assessment will then be announced for public review and comment prior to submitting to EPA as the Integrated Report and candidate 303(d) list.~~

~~Data collected in recent years within the time frames specified in the "call for data" may be submitted for consideration in the assessment. Data submitted previously that Ecology did not use because of quality assurance (QA) concerns should not be resubmitted unless new QA information is submitted that enables Ecology to use the data.~~

~~Data collected within ten years of the published call-for-data end date for each Assessment will be consolidated and assessed with other data of the same waterbody segment and parameter. Data older than ten years will not be used in the Assessment but may be submitted to Ecology's Environmental Information Management (EIM) system for other purposes. These data may be used when necessary to determine historical natural conditions if the data meet the QA requirements in place at the time of its collection.~~

~~Numeric data must be submitted to Ecology's EIM database to be used for the Assessment. Exceptions to this requirement may be made if the data submitter has made alternate arrangements with Ecology, or data are retrieved from other state and federal databases that meet~~

~~the same level of quality. Information on electronic data submittals to EIM can be found at the following website, http://www.ecy.wa.gov/eim/. Sample values from continuous datasets, such as the temperature seven-day average daily maximum (7DADMax), should be reported as calculated values. Sample values from continuous datasets should include the proper EIM parameter label (e.g. Dissolved Oxygen (daily minimum); pH (daily maximum) or pH (daily minimum); Temperature, water (daily maximum)). EIM does not currently accept continuous data. However, on a case-specific basis Ecology may accept continuous data in electronic form for purposes of the Assessment.~~

~~Data in EIM are available to the public on Ecology's website and are accessible for independent review of listing decisions. EIM can also be used in a broader context to identify all data within specific geographic locations, or to identify areas that need further monitoring. Information other than numeric data, such as narrative information, may be submitted directly to the Assessment coordinator.~~

~~Quality assurance requirements must be met by all data used for this assessment. Sampling and analyses must be conducted under a documented QA Project Plan or other quality assurance procedures that Ecology determines to be equivalent in providing for high quality data. Data sets must be complete, that is, not censored to include only part of the data results from the project.~~

~~Occasionally, Ecology receives unusable data that cannot be relied upon to determine the status of water quality. Data that is considered unusable will not be used for the Assessment or maintained in the Assessment database. These data may still be available in EIM with the appropriate associated QA designation. The following are examples of unusable data:~~

- ~~Adequate quality control efforts are not documented.~~
- ~~There are problems regarding quality assurance, sampling, laboratory procedure, or similar issues that do not meet the minimum requirements for a QA Project Plan.~~
- ~~Data quality control documentation is available, but Ecology has significant concerns about its reliability.~~
- ~~The sample location information is not provided or is insufficient to apply the data to the appropriate waterbody segment.~~
- ~~The data do not contain the required elements necessary for assessing compliance with water quality standards described in General Requirements of Section 4.~~

1D. **Ensuring Data Credibility in the Assessment** [NEW SECTION]

In 2004, the Washington State Legislature passed the Water Quality Data Act (*RCW 90.48.570-590*). This legislation requires Ecology to ensure the credibility of data used in the implementation of Clean Water Act programs through the application of quality assurance (QA) protocols. This includes the development of the State's Water Quality Assessment (WQA) also known as the 303(d) list and 305(b) report.

Ecology established Policy 1-11, chapter 2, *Ensuring Credible Data for Water Quality Management"* (data credibility policy) to address the quality of data used in the WQA, in accordance with the RCW 90.48.585(3)(b). The policy describes how Ecology evaluates the credibility of data and information using quality assurance procedures, and water quality regulations, policies, and guidance. It also contains data credibility guidance for stakeholders whose data is potentially usable in the WQA.

Washington State law (*RCW 34.05.272*) also requires Ecology's water quality program to identify, categorize, and make publically-available the sources of information reviewed and relied upon when preparing to take a significant agency action.

EPA requires that states document all sources of data and information that are used in the development of their 303(d) lists as well as provide the reason for any sources of data and information that were not used. In fulfilling these state and federal requirements, Ecology compiles a list of data and information considered in the development of the WQA and makes it publicly available when the assessment is submitted to EPA.

Data Evaluation for Use in the Assessment

Data used in the WQA must be credible. In accordance with RCW 90.48.585 and the Data Credibility Policy (Policy 1-11, Chapter 2) data are considered credible if:

- Appropriate quality assurance and quality control procedures were followed and documented in collecting and analyzing water quality samples;
- The samples or measurements are representative of water quality conditions at the time the data was collected;
- The data consists of an adequate number of samples based on the objectives of the sampling, the nature of the water in question, and the parameters being analyzed; and
- Sampling and laboratory analysis conform to methods and protocols generally acceptable in the scientific community as appropriate for use in assessment the condition of the water.

Sampling and analyses must be conducted under a formal Quality Assurance Project Plan (QAPP) or an equivalent plan (such as established standard operating procedures) that documents quality assurance. The Data Credibility Policy describes key criteria for ensuring the credibility of data used, including:

- Section 5: Components of an Approvable Quality Assurance (QA) Project Plan
- Section 6: Monitoring Procedures
- Section 7: Minimum Documentation for Data Submission and Recordkeeping.

Quality Management Planning at Ecology

Collectively, data quality management at Ecology serves to meet the credible data objectives outlined in the Data Credibility Policy at multiple levels,

Ecology operates under an agency *Quality Management Plan*. The goal of the *Quality Management Plan* is to ensure that data collected by Ecology (as well as by Ecology funded contractors, grantees, loan recipients, and permittees) are of known quality and usable for intended purposes. To this end, the Ecology quality management system involves many aspects of agency operations, including:

- Project Planning for quality assurance
- Document development (operating procedures and reports), document control, and document standardization
- Internal laboratory operations
- Laboratory accreditation
- Data management
- Field sampling and analytical procedures, field auditing, and field proficiency

Quality Assurance Project Plans

The Department of Ecology relies on quality assurance to monitor, improve, and assess its scientific practices, especially those involving generation and assessment of environmental data. Ecology's QA/QC system is based on requirements established by the U.S. Environmental Protection Agency and incorporates guidance and methodology from many standards-setting organizations worldwide.

Each environmental study conducted by or for Ecology must have an approved QAPP. The QAPP describes the objectives of the study and the procedures to be followed to achieve those objectives. Ecology has developed numerous QA documents to assist entities in collecting credible data, including the following templates, guidelines, checklists, and sample plans.

- Use the QA project plan template for the development of your QA project plan. The template includes information and instructions needed for the preparation of a QA project plan (QAPP).
- Examples of Quality Assurance Project Plans links to well-written QAPPs for completed projects.
- The QAPP Review Checklist can also be used as you prepare the QA Project Plan; it provides a list of all the required elements for the plan.
- Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies is a downloadable Ecology publication on preparing a QAPP. This document presents detailed guidance on preparing a QAPP. It describes the elements to be addressed in the plan and provides supporting information relevant to the content of each element.

Standard Operating Procedures

Ecology has also developed a full suite of standard operating procedures (SOPs) for field sampling and field analytical activities undertaken. SOPs for the collection, processing, and analysis of stream samples (EAP034 Publication #17-03-207) provides information useful to data submitters for the WQA.

A full list of SOPs can be found in Appendix 1 at the end of this document, and SOPs specific to a pollutant parameter can be found at the end of each section in Parts 2 and 3. Ecology is in the process of publishing all SOPs and making them available on Ecology's website. If you cannot find a specific SOP on the website, please contact Ecology at 303d@ecy.wa.gov to request a copy.

Data Verification

Data verification is used to determine the credibility of data for use in the WQA. It is defined as the examination of a dataset for errors or omissions, and assessment of data quality indicators related to that dataset for compliance with acceptance method quality objectives. Data validation is not typically necessary for the purpose of the WQA; it is a much more detailed analyte-specific and sample-specific process that extends the evaluation of data beyond data verification to determine the usability of a specific data set.

Ecology programs perform data verification at multiple points to ensure the credibility of data to be used in developing the WQA. For example:

- The QAPP provides the foundation for data verification by the data submitter. Prior to submitting data into EIM, the data submitter must indicate the level of quality assurance that was planned at the outset of a project as well as the level of quality that was achieved in data collection and analysis.
- Ecology staff perform quality control checks before data are loaded to the EIM database.
- The EIM database relies on a multitude of business rules intended to filter out poor quality and duplicative data.
- Ecology's WQA automation software, which downloads and analyzes data from EIM and the federal Water Quality Portal, has numerous business rules focused on data usability, such as identification of appropriate lab/field methods and units of measure for parameters.
- When any errors or questionable results are reported to Ecology by stakeholders, the issue is investigated and addressed. Data of poor or unknown quality are removed from the WQA.

Lab Accreditation Program

Ecology maintains a Lab Accreditation Database to track accreditation status of the labs in the program. This database tracks accredited parameters and status and also issues renewals and accreditation certificates.

Ecology's Environmental Laboratory Accreditation Program Procedure Manual explains procedures for implementing the Environmental Laboratory Accreditation Program, administered by Ecology. The manual provides guidance to laboratories participating in the program and to users of data produced in these laboratories.

Any data collection funded by Ecology must use an accredited lab. More information on choosing an analytical laboratory can be found on Ecology's website.

Data Unusable for the Assessment

Ecology reserves the right to request further quality assurance documentation from any entity that has submitted data for use in the WQA. If Ecology determines that insufficient QA documentation is available, that the documentation indicates significant concerns about the quality of the data or information, or that there are flaws in a dataset or other information (this includes data provided during earlier WQA cycles), then the data or information will not be used as a basis to determine the status of water quality.

Data that are considered unusable will not be used for the WQA. These data may still reside in EIM with the appropriate associated QA designation. The following are examples of unusable data:

- There are problems regarding quality assurance, sampling, laboratory procedure, or similar issues that do not meet the minimum requirements for a QAPP.
- Quality control efforts are not adequately documented.
- Data quality control documentation is available, but Ecology has significant concerns about the sufficiency of the quality control measures.
- The sample location information is not provided or is insufficient to accurately associate the data to an AU.
- The data do not contain the required elements necessary for assessing compliance with water quality standards as described in Policy 1-11, Chapter 2.

1E. Data and Information Submittals [NEW SECTION]

The purpose of the WQA is to determine the status of the State's water quality based on water quality standards and available data. The WQA will be based on available data and information that meets the requirements of this policy. Generally numeric and narrative data will be used for WQA purposes, depending on the parameter. Modeled data that meet credible data requirements will be allowed when the status of water quality is being determined in relation to natural conditions.

The decision to place a waterbody in a given category must be based on data that are representative of the AU at the time of sampling. Water quality monitoring projects are typically based on objectives to determine the overall quality of the water. There are some projects in which objectives are to characterize a localized condition, such as at the location of a discharge pipe prior to complete mixing, or within a lake swimming beach during times of peak recreation use. These kinds of projects may not be representative of ambient water quality and will not be used to assess the status of waters for the WQA.

Data sets must be complete, that is, not censored to include only part of the data results from the project.

Numeric Data Submittals

Data and information will be obtained by Ecology in one of three ways:

1. Numeric data submitted to Ecology's Environmental Information Management (EIM) system.
2. Numeric data retrieved from the federal Water Quality Portal (includes data federal, tribal and other sources that meet the same level of quality required by Ecology).
3. Information other than numeric data, such as a study used to make a determination based on narrative standards, submitted to Ecology for consideration.

Exceptions to receiving data and information as described above may be made if the data submitter has made alternate arrangements with Ecology, or credible data are retrieved from other state and federal databases.

Numeric Data Submitted to EIM

Individuals and organizations submitting numeric data for consideration must submit data to Ecology's EIM database to be used for the WQA. Information on electronic data submittals to EIM can be found at the following website, http://www.ecy.wa.gov/eim/.

Data in EIM are available to the public on Ecology's website and are accessible for independent review of listing decisions.

The minimum information required in data submittals include:

- An EIM account established to identify the person and organization submitting the data.

- The location of each sample station, including coordinates, waterbody name, location description, NHD reach code for all lakes and streams, NHD Reach Measure for all streams, and other necessary metadata. Waterbody
- The date and time the sample was taken.
- The parameter measured.
- The measured value.
- The unit of measurement.
- For non-detect or non-quantifiable data, include the appropriate result data qualifier along with the detection limits and/or reporting limits provided by the laboratory.
- The method used to measure the parameter.

Data submittals must include precise, sufficient information on the name of the waterbody and location of the sample station to allow for accurate mapping, using the National Hydrography Dataset (NHD). The longitude and latitude of each sample station and associated reference datum is required (e.g., North American Datum 1983 or North American Datum 1927). For rivers and streams, the NHD Reach Code and Reach Measure is required. For lakes less than 1,500 acres, the NHD Reach Code is required. For lakes larger than 1,500 acres, the marine grid segmentation will apply.

Data submitters must document the Study QA Planning level, and document the degree to which the data were verified by setting the Study QA Assessment Level at the time that data is submitted to Ecology for loading into EIM.

Trend information and associated data submitted for the WQA will only be used if it has been collected through a valid statistical methodology (see USGS publication, *Statistical Methods in Water Resources*, September 2002).

Only one parameter value per day per AU will be used in the WQA. The highest measurement per day will be used unless otherwise specified, except for dissolved oxygen for which the lowest measurement will be used, and pH for which the highest or lowest measurement will be used as applicable.

Quality Assurance Level's for Data Submittals to EIM

Ecology's EIM database is the agency repository for the vast majority of environmental information generated by Ecology as well as outside data submittals. The database is a robust and powerful web-based, GIS-friendly reporting tool for analysis and production of reports and maps detailing environmental conditions throughout Washington. Data entry standardization is an important concern for EIM managers and staff. Ecology periodically conducts training on the EIM system, for both Ecology staff and external users.

The majority of data used by Ecology for the WQA is housed in EIM. Datasets undergo data verification checks while being submitted to EIM. Ecology only uses EIM data in the WQA that has been assigned as Level 3 or above for both QA/QC planning and assessment. A QA Planning Level of 3 or above means that, at minimum, a project operated under a QAPP or equivalent

plan. The table below displays the different QA assessment levels. The WQA's exclusion of data having a QA Planning or QA assessment below Level 3 aligns with the requirements in Policy 1-11 Chapter 2 to have appropriate quality assurance and quality control procedures documented and followed.

EIM Quality Assurance Levels for Data Submittals		
QA Assessment Level	**Short Description**	**Long Description**
Level 1	Data neither Verified nor Assessed for Usability	No assessment information is available
Level 2	Data Verified	**Data Verified:** Study quality control (QC) results have been examined for compliance with acceptance criteria specified in the QAPP, SAP or field/analytical method. **Additional Explanation:** **For lab data –** Determine conformance with Method Quality Objectives (MQO) as stated in applicable QAPP, SAP, SOP or analytical method. Sample duplicates, matrix spikes, surrogate standards, and Lab Control Standards are examples of the types of information that may be evaluated. Ensure that EIM data entry protocols are followed to maximize accuracy in data entry. **For field measurements** – Verify that all field operations were controlled by the use of current and approved SOPs. SOPs contain method-specific calibration and verification protocols for all field analytical operations.
Level 3	Data Verified and Assessed for Usability	**Data Assessed for Usability:** Study data package has at a minimum been evaluated for precision, bias, sensitivity, representativeness, comparability, and completeness as specified in the QAPP or SAP, and assessed for usability specified in the project data quality objective.
Level 4	Data Verified and Assessed for Usability in a Formal Study Report	**Formal Study Report:** Document describing Study objectives, procedures, results, conclusions and assessment of the quality of the data. Bibliographic citations should be provided.
Level 5	Data Verified and Assessed for Usability in a Peer-Reviewed Study Report	**Peer Reviewed Study Report:** Report was checked or reviewed for accuracy and completeness by a supervisor or colleague with appropriate experience (does not require independent, outside scientific review, as for juried publications).

Numeric Data Submitted to the Federal Water Quality Portal
Numeric data that are retrieved from the federal Water Quality Portal database that meet data credibility requirements will be used in the WQA.

Information Submittals Based on Narrative Standards
In addition to numeric criteria, Washington's water quality standards include narrative criteria at WAC 173-201A-260(2) that are designed to protect existing and designated uses for fresh and marine waters from adverse effects to aquatic life or public health uses. The assessment of water quality can be based on narrative criteria that demonstrates impairment of a designated use.

Parts 2 and 3 of this policy describe specific assessment considerations for addressing water and sediment quality parameters. Narrative criteria may be used in conjunction with numeric criteria as described in the parameter sections. In addition, Part 2 includes specific assessment considerations based on the narrative standards for bioassessment (to protect benthic aquatic life), and toxics data (to protect for fish and shellfish harvesting).

Assessment of Studies to Determine Impairment based on Narrative Standards
For water quality studies that are submitted to Ecology for consideration in the WQA, the study must show a link between the environmental alteration in the waterbody and the impairment of a beneficial use. In order to use information to make a Category 5 listing based on narrative criteria, the data submitter must provide information to show:

- Documentation of a designated use impairment in the AU, **and**
- Documentation that deleterious, chemical, or physical alterations are causing the designated use impairment in the same AU.

For example, to create a 303(d) listing based on a study showing harm to wildlife from a specific toxin, the study would need to demonstrate that the toxin was causing adverse effects to wildlife, and demonstrate the source of the toxin to be a specific waterbody. The linkage between source, cause, and effects needs to be clearly documented in order to meet credible data requirements in Washington.

Narrative information regarding impairments by non-pollutant (such as habitat or flow alterations) will be assessed in the same manner and may lead to a Category 4C (Impaired by a Non-Pollutant) listing.

Information other than numeric data, such as a study used to make a determination based on narrative standards, should be submitted directly to the Water Quality Program, through postal mail or by email at 303d@ecy.wa.gov.

Additional Information on Data Submittals

Age of data considered in the WQA
Data collected within ten years of the published call-for-data end date for each WQA will be consolidated and assessed with other data of the same AU and parameter. Generally, data older than ten years will not be assessed for that cycle, unless specified under the parameter-specific

WQA considerations described in Part 2. Data older than ten years may also be considered when necessary to determine natural conditions.

Evaluation of newly submitted data will be conducted by adding the new data to previously assessed data that are less than ten years old. Listings that exist from data older than ten years (in other words, from a previous WQA) will remain in the category previously assigned if no more recent data is available to assess. Listings from previous WQA cycles will not automatically be reassessed according to the latest policy unless more recent information associated with the parameter and AU is available, or it is determined that the data the old listing was based on did not meet quality assurance requirements in place at the time of its collection.

Determining appropriate standards in brackish waters

Application of fresh and marine water criteria may vary depending on salinity concentrations in brackish waters of estuaries. In these cases, the method to determine what standards apply is described in WAC 173-201A-260(3) (e). For brackish water, if information is not available to determine the delineation between marine and freshwater criteria, then the more stringent of the two criteria will apply as described in WAC 173-201A-260(3)(c). See: EAP075 - Measuring Vertically Averaged Salinity in Brackish Waters

Use of non-detect samples

Non-detect sample values will be considered in the assessment, but can only be used to show compliance with water quality criteria when the detection limit is less than the criteria. For calculating a geometric mean using non-detect samples, in which a zero cannot be used, a value will be chosen so as not to bias the geometric mean high or low.

Determination and use of field replicate samples

Field replicate sample values in EIM are averaged together if they are identified as field replicates. Additionally, for some parameters, samples collected at the same location within a specified time frame may be averaged. Bacteria samples are averaged if the samples are collected in the same location, less than 15 minutes apart. Bacteria samples are averaged within 15 minutes to reduce bias in situations where an additional sample(s) was collected at a different time of the same day. Dissolved oxygen, pH, and temperature samples are averaged if they are collected at the same location, less than 5 minutes apart. The resulting calculated value is treated as a single sample in the WQA.

Comparison of Data to a Water Quality Criteria Expressed as an Average

Instantaneous measurements are assumed to represent hourly averaging periods specified in the State's surface water quality standards for both acute and chronic criteria (e.g., 1-hour average for the acute criteria for toxic substances). In cases where criteria for toxic substances are expressed in the standards as an average over a number of days (e.g., 4-day average for the chronic criteria for toxic substances), samples collected from a representative site are averaged to assess compliance with the criteria during the specified averaging time. In cases where only one grab sample is available to represent the specified averaging period then that sample is used to represent the average concentration over the averaging period.

Assessment of Data and Information for Specific Pollutant Parameters

Assessment decision requirements for specific pollutant parameters are described in Parts 2 and 3. Part 2 includes the basis for WQA decisions based on data requirements and the category determination process for the following parameters: bacteria, bioassessment, dissolved oxygen, pH, total phosphorus (in lakes), temperature, total dissolved gas, toxic aquatic life and human health criteria, and turbidity. Part 3 includes the basis for WQA decisions based on data requirements and the category determination process for sediment quality criteria.

Third Party Data Submittals

Submittals of information by third parties must include documentation addressing the accuracy and completeness of the information submitted to Ecology, including documentation that the required QA objectives were met. The use of third party data will be at the sole discretion of Ecology.

~~Guidance for preparing a QA Project Plan and for assessing data is available from several sources.~~

~~**Ecology**~~

- ~~*Guidelines for Preparing Quality Assurance Plans for Environmental Studies* (2004), Publication No. 04-03-030 (www.ecy.wa.gov/biblio/0403030.html).~~
- ~~*Sediment Sampling and Analysis Plan Appendix: Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards* (*Chapter 173-204 WAC*), Publication No. 03-09-043. February 2008 (www.ecy.wa.gov/biblio/0309043.html).~~

~~**Department of Natural Resources**~~

~~1.~~ ~~TFW-AM9-99-005, DNR publication 107~~

~~**EPA**~~

- ~~*Requirements for Quality Assurance Project Plans* (www.epa.gov/quality/qs-docs/r5-final.pdf)~~
- ~~*EPA Guidance for Quality Assurance Project Plans* (www.epa.gov/quality/qs-docs/g5-final.pdf)~~
- ~~*The Volunteer Monitor's Guide To Quality Assurance Project Plans*, EPA 841-B-96-003, (www.epa.gov/owow/monitoring/volunteer/qapp/vol_qapp.pdf)~~
- ~~*EPA Guidance on Environmental Data Verification and Data Validation* (www.epa.gov/quality/qs-docs/g8-final.pdf)~~
- ~~*EPA Data Quality Assessment: A Reviewer's Guide* (www.epa.gov/quality/qs-docs/g9r-final.pdf)~~
- ~~*EPA Data Quality Assessment: Statistical Tools for Practitioners (www.epa.gov/quality/qs-docs/g9s-final.pdf)*~~

~~**General Requirements**~~

~~The data submitter should provide Ecology with the following information either before or accompanying data submission:~~

- ~~An electronic copy of the QA Project Plan (or the equivalent document), or revisions to a previously submitted QA Project Plan, and any other information necessary for Ecology to evaluate the data for exceptions according to the guidance.~~
- ~~The applicable dates of the QA Project Plan, including any revisions.~~
- ~~Written assurance that the methods and procedures specified in the QA Project Plan were followed.~~
- ~~The information that satisfies the required fields in the EIM database including the name of the laboratory(s) used for sample analyses and its Laboratory ID number, along with a report of results and a data verification report provided by the laboratory. Field data must be accompanied by a data verification report which includes the name of the organization that performed the measurements.~~
- ~~All field notes, laboratory comments, or laboratory notations concerning a deviation from standard procedures, quality control, or quality assurance that affects data reliability, data interpretation, or data validity.~~
- ~~The quality assurance/quality control documentation, including the analytical methods used by the laboratory, method number, detection limits, quantitation or minimum levels, if available, and all quality control samples and standards necessary to properly interpret data different from that stated in the QA Project Plan.~~
- ~~The QA documentation requirement includes a summary of data assessment documentation including report(s) of data verification and data validation if available, and assessment of data for usability in meeting the objectives expressed in the QA Project Plan.~~
- ~~If requested by Ecology for interpreting or validating data, any other information, such as complete field notes, photographs, climate, or other information related to flow, field conditions, or documented sources of pollutants in the watershed.~~
- ~~The following information must be retained for at least five years (ten years for records associated with data from grant and loan projects) and provided to Ecology if requested:~~
  - ~~i. Other information, such as complete field notes, photographs, weather, or other information related to flow, field conditions, or documented sources of pollutants in the watershed for interpreting or validating data.~~
  - ~~ii. All records associated with the generation and interpretation of sample results, including documentation related to adherence to the QA Project Plan, or coordinate with Ecology to ensure that adequate records are maintained.~~
- ~~Field instruments, such as multi-parameter devices (Hydrolabs™), must be operated and calibrated according to the manufacturer's recommendations, or other acceptable demonstrated method. Calibration information and any other appropriate documentation of accuracy must be submitted if requested by Ecology.~~

~~This documentation requirement does not apply to data submitted for water quality assessments prior to the 2006 Assessment.~~

~~Any additional requests by Ecology for further documentation must be made available in order to assess the data received. If Ecology determines there are flaws in QA planning or implementation that reduce confidence in any submitted data, including data provided during earlier assessment cycles, then that data will not be used as a basis for categorizing a waterbody segment.~~

~~Verification of adherence to QA requirements may be examined by Ecology through the use of selected sampling of projects entered into EIM. The results of the limited audit will be used to determine if additional investigation is warranted. Corrective action may include the censoring of QA levels entered into EIM, rejection of data, or other actions deemed appropriate.~~

~~The data submitter must ensure that chemical, microbiological, physical, radiological, and toxicological samples (excluding data generated by field methods) are analyzed in a laboratory accredited by Ecology for the specific parameter needed, or obtain a waiver to this requirement in accordance with Ecology Executive Policy 1-22. Use of laboratories not accredited by Ecology must be approved by Ecology prior to the start of monitoring. The monitoring entity must seek and obtain a waiver to the Executive Policy 1-22 requirement. A list of laboratories and the methods for which they are accredited can be found at www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html. Executive Policy 1-22 does not apply to data obtained in the field or to benthic analyses.~~

~~The minimum information required in submittals includes:~~

- ~~The location of each sample station in latitude and longitude in decimal degrees to an accuracy of seven decimal places for each.~~
- ~~Waterbody name and sampling location description, (for example, Colony Creek; near mouth, just before tide gate).~~
- ~~The date and time the sample was taken.~~
- ~~The pollutant or condition measured.~~
- ~~The measured value.~~
- ~~The unit of measurement.~~
- ~~For non-detect or non-quantifiable data, the "less than" value associated with the method detection limits or practical quantitation limits.~~
- ~~The method used to measure the pollutant or establish the condition (ie. EPA method number).~~
- ~~The name of the individual submitting the information.~~
- ~~The source of the information, (for example, Dept. of Ecology, Cowlitz Conservation District, or Snohomish County).~~

~~Submittals may include additional information, such as: (1) documentation of associated field conditions such as adjacent land uses, weather during sampling, and suspected and likely sources of water quality problems, and (2) identification of the persons conducting the sampling and analysis. Examples of adjacent land uses include residential, industrial (specify the industry, if possible), municipal, and agricultural (dairy, cropping, forage crops, horse or cow pasture).~~

~~Identification of the suspected or likely source of a water quality problem should be accompanied by an explanation of how that identification was made.~~

~~Data submittals must include precise, sufficient information on the name of the waterbody and location of the sample station to allow for accurate mapping. The longitude and latitude of each sample station and associated reference datum is required (e.g., North American Datum 1983 or North American Datum 1927). For rivers, streams, and lakes less than 1,500 acres, the township, range, and section is also required.~~

~~For more guidance on sampling issues and environmental study design, see Ecology's *Technical Guidance for Assessing the Quality of Aquatic Environments*, Publication No. 91-78 (www.ecy.wa.gov/biblio/9178.html); and EPA's Document QA/G-5S, *Guidance for Choosing a Sampling Design for Environmental Data Collection* (EPA, 2001).~~

~~Water and sediment testing must be conducted according to an approved method with a quantitation limit that yields reliable results at concentrations that are less than the criterion. For guidance on quantitation limits, refer to Tables VI-2 and VI-3 as updated in the Ecology Permit Writer's Manual, Publication No. 92-109 (www.ecy.wa.gov/biblio/92109.html) and Table 5 in the *Sediment Sampling and Analysis Plan Appendix* (www.ecy.wa.gov/biblio/0309043.html) for sediment analyses.~~

~~Documentation of data verification and data validation must be provided with all data submitted for this assessment process, indicating that the objectives of the QA Project Plan or equivalent QA procedures were met. A usability determination may substitute for data validation. The assessment of the data must also consider whether the data, in total, fairly characterize the quality of the waterbody at that location at the time of sampling.~~

~~Trend information and associated data submitted for the Assessment will only be used if it has been collected through a valid statistical methodology (see USGS publication, *Statistical Methods in Water Resources*, September 2002).~~

~~Submittals of information by third parties must include documentation addressing the accuracy and completeness of the information submitted to Ecology, including documentation that the required QA objectives were met. The use of third party data will be at the sole discretion of Ecology based on the acceptability of the accompanying documentation.~~

~~**Specific Requirements**~~

~~In addition to the general requirements stated previously, parameter-specific requirements can be found in Section 8.~~

Ecology Contacts for Submittal

For more information on how to submit data, see the Ecology 303(d) website at: www.ecy.wa.gov/programs/wq/303d/index.html.

Or contact Ecology staff at: 303d@ecy.wa.gov, (360) 407-6400.

To submit data, see the EIM website at: www.ecy.wa.gov/eim/.

~~5~~1F. Category –Descriptions

Waters in the State (except on tribal reservation lands) will be assigned to one of the five categories in the following descriptions. These five categories are based on, though not identical to, the categories recommended in EPA's *Guidance for 2006 Assessment, Listing, and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* (July, 2005).

Only one category, Category 5, constitutes the 303(d) list of impaired waters. All the categories together represent the statewide ~~assessment~~WQA of the State's water quality and will be submitted to EPA and the public as the ~~Assessment~~WQA, referred to as the "Integrated Report" in EPA guidance.

When data are available for more than one water quality parameter in the same ~~waterbody segment~~AU, Ecology will do a separate ~~assessment~~evaluation for each parameter. For example, ~~a waterbody segment~~an AU that is placed in a category due to one pollutant may also be placed in a different category for another pollutant.

Category 1. Segment Meets Tested Criteria

~~Where~~Category 1 is not part of the 303(d) list. When recent, available data are of sufficient quality and quantity to show attainment of the water quality standard for a parameter within ~~a segment~~an AU, the ~~segment~~AU will be placed in the *Meets Tested Criteria* category. To qualify for this category, some data must be available for ~~a waterbody segment which~~an AU that shows attainment of the applicable water quality standard during a "critical condition" period. It is not sufficient merely to have a lack of evidence of impairment. ~~This category is not part of the 303(d) list.~~Parts 2 and 3 of this document describe specific assessment considerations for moving AUs to Category 1.

Placement of ~~a waterbody segment~~an AU in Category 1 does not constitute a determination of compliance or noncompliance with water quality standards for any other purpose (such as for permitting). Placement in Category 1 does not necessarily mean that all criteria have been assessed or studied in the AU. A waterbody~~ segment. A water body~~ may be placed in this category for certain parameters while also being listed in another category for a different pollutant.

Where a TMDL has been approved, data results for a monitoring location within the TMDL boundary may indicate that the listing should be placed in Category 1 based on data alone. However, in certain cases the waterbody listing ~~will be placed, or~~may remain~~,~~ in Category ~~4a~~4A (*Has a TMDL*~~) until the TMDL is completely implemented or data provides conclusive evidence that sources in the vicinity of the monitoring location are not contributing to further water quality standards impairment in the rest of the basin.~~). See ~~the Section 7~~Part 1F, Category 4A, "Assessment of ~~Water bodies Within~~Data within a TMDL Boundary" for more details.

Category 2. Segment is a Water of Concern

~~Sometimes data that are not sufficient for listing a waterbody segment in~~ Category ~~5 may still raise a concern about water quality. Examples of this include:~~

- ~~1. Data show some excursions of applicable water quality criteria, but there are fewer excursions than are necessary to sufficiently determine that the severity of the problem warrants a Category 5 listing.~~
- ~~1. Narrative information raises concerns, but it is not sufficient for listing in Category 5.~~

~~In these and similar cases, the waterbody segment will be placed in the *Waters of Concern* category. Some specific situations when segments should be included in this category are described in the sub-sections under Section 82. Situations not specifically described will be assessed by Ecology on a case-specific basis. This category~~ is not part of the 303(d) list.

Category 2 applies when credible data create concerns of possible impact to designated uses, but fall short of demonstrating that there is a persistent problem. To place ~~a waterbody segment~~an AU in this category first requires a decision that the water should not be in Category 5. Once that decision is made, ~~segments~~AUs will be placed in the *Water of Concern* category when there are remaining concerns that reduce confidence that the tested ~~criteria~~water quality standards are in fact met. Examples of this include:

1. Data show some exceedances of applicable water quality criteria, but there are fewer exceedances than are necessary to sufficiently determine that the severity of the problem warrants a Category 5 listing.
2. Narrative information raises concerns, but it is not sufficient for listing in Category 5.

In these and similar cases, the AU will be placed in the *Waters of Concern* category. Some specific situations when AUs should be included in this category are described in the sections under Parts 2 and 3. Situations not specifically described will be assessed by Ecology on a case-specific basis.

The *Water of Concern* category is intended to help Ecology and the public be aware of, track, and investigate these water quality concerns. Ecology and others should pursue ~~as many opportunities as possible to conduct~~ additional monitoring ~~and sampling~~, incorporate the waterbody into existing studies, or find other means to confirm ~~(and correct)~~ or refute the suspected problem.

Category 3. Segment Lacks Sufficient Data

Category 3 is not part of the 303(d) list. When there are insufficient ~~water quality~~ data available to ~~make~~evaluate if a ~~determination on the status of~~ water quality ~~criteria or a designated use~~standard is being met, the ~~waterbody segment~~AU will be placed in the ~~*Lacks Sufficient*~~*Insufficient Data* category. ~~Listings from data placed in this category still must meet data quality standards. This category will include all waters in the State (except on tribal reservation lands) that lack sufficient information for placement in~~AUs without any ~~other category. Waterbody segments that have no data associated with the segment location~~ data are considered by default to be in Category 3 ~~but are not given listing identification numbers until some data are available to assess. This category is not part of the 303(d) list.~~

Category 3 listing information will be maintained in Ecology's ~~assessment~~WQA database for potential future use. ~~Data and information which supplements a Category 3 listing may become available in a future Assessment. In this case, Ecology will reassess both the current and new listing information to determine if all available data are sufficient to make a new category determination according to this policy.~~

Category 3 may also be used for ~~waterbody segments~~AUs within the boundary of a TMDL under development. ~~Segments~~AUs based on datasets found to be incomplete or inconclusive for determining the appropriate category will be placed in Category 3 and reassessed after the TMDL has been approved by EPA.

Category 4. Impaired but Does Not Require a TMDL

Category 4 is not part of the 303(d) list. This category acknowledges those ~~waterbody segments~~AUs which are impaired but are not appropriate for listing in Category 5 because:

- EPA has approved the respective TMDL for ~~the specified~~a given pollutant~~(s)~~ (Category ~~4a~~4A).
- ~~An effective~~A clean-up program other than a TMDL is already in place (Category ~~4b~~4B).
- The impairment is not known to be caused by a pollutant, and therefore a TMDL is not appropriate to address the impairment (Category 4c).

~~Category 4 is not part of the 303(d) list. It has three subcategories.~~

Category 4~~A~~a . ~~Segment~~ Has a TMDL Approved by EPA
Data showing that a designated use is impaired by a pollutant is placed into Category 5. When a TMDL addressing ~~that impairment~~a pollutant has been developed and been approved by EPA, the ~~waterbody segment~~AU/ parameter combination will be moved to *Category ~~4a~~4A: Has a TMDL*. A Category 5 listing is no longer required because the primary purpose of a Category 5 listing – to ~~lead to preparation and implementation of a TMDL~~ develop a plan that will bring the water back into compliance with water quality standards – has been achieved. ~~This category does not include situations where EPA~~ AUs that are part of a TMDL that has ~~disapproved the TMDL and~~ not yet ~~adopted a federal TMDL, nor does it include situations where~~been approved by EPA will remain in Category 5 until EPA has taken an approval action. When Ecology determines that ~~the~~a TMDL is not being successfully implemented~~. In these cases,~~, the AUs within the ~~impaired listing(s)~~TMDL will ~~remain or~~ be placed back in Category 5.

If sufficient data within a Category ~~4a~~4A listing indicates that the ~~specific waterbody segment is no longer contributing to impairment within its watershed~~standards are now being met, then the ~~segment~~AU may be placed in Category 1. See the ~~Section 7~~Part 1F, Category 4A, "Assessment of ~~Water bodies~~Data within a TMDL Boundary" for more details on when ~~waterbody segments~~AUs move in or out of Category ~~4a~~4A. If a TMDL has been declared completed and implementation has ended, but at that time or later the ~~waterbody segment~~AU is again shown to be impaired, then the ~~segment~~AU will be returned to Category 5.

Assessment of ~~Water bodies~~Data within a TMDL Boundary [MOVED FROM SECTION 7 & EDITED]

~~When a~~A TMDL ~~is developed because~~study can be triggered when one or more Category 5 listings ~~within the watershed boundary~~ indicate impairment~~, the~~ by a pollutant. A TMDL ~~applies to all water bodies within the boundary of the TMDL. The TMDL~~study is an in-depth ~~study~~analysis that addresses which waters are ~~violating~~not meeting standards, which waters are contributing to downstream ~~violations~~impairments, and what needs to be done for all waters within the TMDL boundary to be brought back into compliance with the standards, natural conditions, or other objectives.

Assessment of Data during TMDL Development [MOVED FROM SECTION 7 & EDITED]

Data generated during the development of a TMDL should not be used for the ~~Assessment~~WQA until the dataset is complete for the TMDL. This avoids conducting an assessment of incomplete datasets. Monitoring data submitted independent of the TMDL study that is within a TMDL boundary needs to also be considered within the context of the TMDL. ~~TMDL~~WQA staff should consult with ~~Assessment~~TMDL staff regarding the adequacy of the additional data to make a category determination. If the dataset is determined to be incomplete or inconclusive for determining the appropriate category, the associated ~~segments~~AUs will be placed in Category 3 and reassessed after the TMDL has been approved by EPA.

Assessment of Data after TMDL is Approved by EPA [MOVED FROM SECTION 7 & EDITED]

Once the TMDL is completed and approved by EPA, all impaired waters monitored ~~waters~~ for the pollutant(s) in the TMDL ~~boundary~~ that have a load or wasteload allocation associated with them are placed in Category ~~4a~~4A. During implementation of the approved TMDL, monitoring data ~~will~~may continue to be collected to help determine if the TMDL implementation is effectively bringing the waterbodies back into compliance with the water quality standards or TMDL objectives. Monitoring data submitted independent of the TMDL study that is within a TMDL boundary needs to also be considered within the context of the TMDL.

The completion of a TMDL provides additional information on contributions of pollutants from ~~waterbody segments~~AUs within the watershed and what is needed to bring a ~~water body~~waterbody or watershed back into compliance with the standards. ~~Therefore, Assessment listing decisions~~When monitoring data within a TMDL boundary ~~need to consider~~is assessed, the ~~TMDL information in addition to the monitoring data. Determining the appropriate category for a waterbody segment within an approved TMDL boundary needs to be performed jointly by Assessment staff and regional TMDL staff to ascertain whether a new or changed assessment category is appropriate based on both data and TMDL information. The~~ following ~~should be considered~~ guidelines apply when moving ~~waterbody segments~~AUs in or out of Category ~~4a~~4A during implementation of an approved TMDL.

Moving a proposed Category 1, 2, 3, or 5 listing to Category 4A [MOVED FROM SECTION 7 & EDITED]

- When new data are assessed for ~~a waterbody segment~~an AU within an approved TMDL boundary, ~~Assessment~~WQA staff will consult with appropriate TMDL staff ~~responsible for the~~

~~TMDL~~ to determine that a load or wasteload allocation exists for that ~~segment~~AU. If the ~~segment~~AU has a load or wasteload allocation associated with it, the ~~segment~~AU will be placed in Category ~~4a~~4A (*Has a TMDL)*. If not, the ~~segment~~AU will be placed in the appropriate category based on data results alone.

Moving an existing Category 4A listing to a Category 1 [MOVED FROM SECTION 7 & EDITED]

~~**It is not always necessary to fully complete all implementation activities within a TMDL boundary before Category 4a listings within the TMDL can move to Category 1.**~~

~~**1.**~~ If new data are assessed for ~~a waterbody segment~~an AU within an approved TMDL boundary and the data indicates that the ~~water body is meeting~~waterbody qualifies for Category 1 (meets tested standards~~, the segment may be moved from Category 4a to Category 1 under certain circumstances:~~) in accordance with the specific parameter determinations described in this policy, the following will occur:

1. ~~The sampling effort is from more recent reporting periods that were conducted during the seasonal or critical condition period identified in the TMDL.~~
2. ~~Best Management Practices (BMP) implementation is occurring where appropriate.~~
3. ~~Previous pollution sources in the vicinity of the monitoring location are not likely to contribute to future impairments at downstream locations.~~

- ~~Assessment~~WQA staff will consult with the appropriate regional TMDL ~~Leads~~staff to share initial data ~~assessment~~WQA results ~~and to verify~~.
- TMDL staff will determine if there are special circumstances in the TMDL that need to be considered in the assessment of the new data or would require the AU to remain in Category 4A in order to ensure that the TMDL is being adequately implemented ~~and there are not known sources in the vicinity~~. Ecology TMDL staff may decide to keep the AU in Category 4A when it is determined to be necessary to appropriately protect water quality and the support of designated uses (for example, to protect marine shellfish beds downstream of a stream reach in Category 4A). Other examples include:
  - Load allocations within the monitored AU are more stringent than the ~~monitoring location~~numeric water quality standard and require the AU to remain in category 4A to continue implementation of the load allocation.
  - A seasonal or critical condition period is identified in the TMDL but was not considered as part of the data assessment.

If a decision is made by Ecology that ~~would contribute to an impairment at a downstream location. Waterbody segments may be moved to~~the AU should remain in Category ~~1 based on data if these conditions are satisfied.~~ 4A due to special circumstances, a remark describing this decision will be documented in the listing record.

Moving ~~waterbody segments~~AUs within a TMDL boundary from Category ~~4a~~4A to Category 1 will not necessarily end further implementation of the TMDL. That will be determined by the terms of the TMDL.

If future monitoring data indicates impairment of a waterbody previously moved from Category ~~4a~~4A to Category 1, then the ~~waterbody segment~~AU will be returned to Category ~~4a~~4A if Ecology determines that the applicable TMDL is active and appropriate for prescribing and scheduling the needed corrective actions. If not, the ~~segment~~AU will be moved back to Category 5.

Category 4B~~b~~. ~~Segment~~ Has a Pollution Control Program in Place ~~(in lieu of a TMDL)~~ that is being Actively Implemented

When ~~data show that a waterbody segment is impaired by a pollutant, but~~ Ecology determines that a local, state, or federal ~~authority~~program or strategy is implementing a pollution control program ~~(or sediment cleanup plan), and Ecology determines that the program or strategy is~~ that is expected to result in the waterbody meeting water quality standards, the ~~segment~~AU will be placed in the *Has a Pollution Control Program* category for consideration by EPA. ~~A 303(d) listing is~~ The waterbody does not ~~required~~ require a TMDL because the pollution control program is designed to ~~improve and attain~~meet water quality standards in a ~~manner comparable to a TMDL and is in the process of being implemented. This will not include cases when Ecology determines that the program is not being successfully implemented. Progress on water quality improvements is an essential element of a successful pollution control strategy. Any Category 5 listings that are proposed by Ecology to move to Category 4b will need involvement by EPA to ensure that the pollution control program meets requirements in the following outline.~~

~~The mere existence of pollution controls, such as permit requirements or water quality regulations, is not sufficient to qualify a waterbody segment for this category. To be placed in the *Has a Pollution Control Program* category, the pollution control program must meet all of the following elements:~~

- ~~Be problem-specific and waterbody-specific.~~
- ~~Have~~ reasonable amount of time ~~limits established for correcting the specific problem, including load reduction or interim targets when appropriate.~~and is being actively implemented.
- ~~Have a monitoring component to evaluate effectiveness.~~
- ~~Have adaptive management built into the plan to allow for course corrections if necessary.~~

How Category 4B decisions will be made

In order for a waterbody to be placed into category 4B, a program must be actively implemented that meets specific requirements. Ecology must submit a written determination to EPA explaining how the program meets the 4B requirements at the time that the draft WQA is submitted to EPA for review. Ecology will work directly with the program implementers to gather all the necessary information and data needed to make the justification to EPA. This determination and gathering of updated information must be done each time Ecology submits a WQA. If for any reason the program is no longer meeting the Category 4B requirements, then the waterbody will be placed in Category 5, the "303(d) list".

Requirements for an Eligible Category 4B Program

The following elements must be met to qualify for placement in Category 4B:

1. Identification of AU and Statement of Problem Causing Impairment

The written determination that Ecology develops must identify the impaired AU(s), including name, general location in the State, and State-specific location identifier, and provide information on the known and likely point, nonpoint, and background (upstream inputs) sources causing the impairment, including the magnitude and locations of the sources.

2. Description of pollution controls ~~or actions stringent enough to attain~~and how they will achieve water quality standards.

- Identify the water quality target: The water quality target is the protection of beneficial uses and the attainment of the numeric criteria that are set to protect that use. This would be the water quality standards that apply to the particular AU.
- Point and nonpoint source loadings that when implemented will achieve compliance with the water quality standards.
- ~~Be feasible, with enforceable legal or financial guarantees that implementation will occur.~~
- ~~Be actively and successfully implemented and show progress on~~ Describe the cause-and-effect relationship between the water quality ~~improvements in accordance with the plan.~~

~~In addition to the conditions listed previously,~~ standard and the ~~program is more likely to gain approval if the following elements are included:~~

- ~~A description of management measures.~~
- ~~An implementation schedule and measurable milestones.~~
  - ~~A description of criteria that are used to determine~~identified pollutant sources. Based on this linkage, identify what loading reductions ~~achieved over time.~~are needed to achieve the water quality standard and protect the beneficial use.
- ~~An information/education component.~~
  - The demonstration Ecology submits should also contain or reference documentation supporting the analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling or data analysis.
- Controls that will achieve water quality standards.
  - Describe all controls (already in place and scheduled for implementation), which will ~~review~~result in reductions of pollutant loadings to a level that achieves the water quality standards. When combined, all loading from point sources and nonpoint sources need to meet water quality standards.
- Description of requirements under which pollution controls will be implemented.
  - Provide information explaining how each pollution control ~~program~~activity that ~~is submitted~~will be implemented is a requirement. Explain how those requirements are enforced and explain how these controls will address the pollutant.

The following is the type of information needed to determine if ~~it meets~~ these ~~elements.~~ controls are "requirements":

- Authority (local, state, federal) under which the controls are required and will be implemented (examples may include: self-executing state or local regulations, permits, contracts, and grant/funding agreements that require implementation of necessary controls);
- Existing commitments made by the sources to implement controls;
- Availability of dedicated funding for the implementation of the controls;

3. Estimate or projection of time when water quality standards will be met

The Program that is seeking to be placed in category 4B must forecast a time estimate by which the controls will result in water quality standards attainment; including an explanation of the basis for the conclusion. The demonstration that Ecology develops for EPA will need to describe why the time estimate for the controls to achieve WQS is reasonable. What constitutes a "reasonable time" will vary depending on factors, such as, the initial severity of the impairment, the cause of the impairment (e.g., point source discharges, in place sediment fluxes, atmospheric deposition, nonpoint source runoff), the riparian condition, the channel condition, the nature and behavior of the specific pollutant (e.g., conservative, reactive), the size and complexity of the AU (e.g., a simple first-order stream, a large thermally stratified lake, a density-stratified estuary, and tidally influenced coastal AU), the nature of the control action, cost, public interest, etc. The timeframe for correcting the impairment will be considered reasonable if it is as fast as practical, given full cooperation of all parties involved, and if it is similar to the timeframe that would likely be developed under a TMDL.

4. ~~Modeling may be required~~Schedule for implementing pollution controls.

The demonstration Ecology develops will describe the implementation schedule for the pollution controls actions.

5. Monitoring plan to ~~show that attainment~~track effectiveness of pollution controls.

The demonstration must include a description of, and schedule for, monitoring milestones to track effectiveness of the pollution controls. The program, for which Ecology is writing the demonstration for, will need to make this monitoring information available to Ecology for each subsequent demonstration in order for a waterbody to maintain 4B status.

6. Commitment to revise pollution controls.

The program must commit to revising the pollution controls, as necessary, if progress towards meeting water quality standards is ~~likely. Documentation must~~ not being shown. Also, the demonstration Ecology submits should identify how any changes to the pollution controls, and any other element of the original demonstration, will be reported to the public and EPA.

Progress will be ~~provided to clearly explain and support how the pollution~~ reviewed every listing cycle and if progress is not going according to plan, particularly if things are getting worse due to a source control ~~program meets the criteria for each specific pollutant and~~ issue, the water ~~body.~~will be placed back into Category 5 until a revised program is developed and implementation has begun.

Any program may qualify if Ecology determines that it meets all of the previously listed requirements. Examples that may qualify for this category include:

- ~~Comprehensive Environmental Response Compensation Liability Act (CERCLA), Model Toxics Control Act (MTCA), or Resource Conservation and Recovery Act (RCRA) sites with signed legal agreements (e.g., Records of Decision) and source control measures to prevent future contamination.~~
- ~~Habitat Conservation Plans with specific plans to address water quality.~~
- Local program developed to improve water quality that adequately addresses the pollutant(s) causing the impairment.
- Wastewater discharge permits or 401 Certifications with conditions or limitations that adequately address the pollutant(s) causing the impairment.
- ~~Local program developed to improve water quality that adequately addresses the pollutant(s) causing the impairment.~~

~~If two or more pollution control projects apply to the same pollutant in the same impaired waterbody segment, and neither project is sufficient alone but their combined effect meets the requirements for this category, then the segment would qualify for this category.~~

Go to Ecology's WQA website to review the existing programs that have waterbodies placed in 4B. http://www.ecy.wa.gov/programs/wq/303d/wqassescat4b.html

All category ~~4b~~4B listings must be reassessed by Ecology during each ~~assessment~~WQA cycle to determine progress:

- If sufficient data within a Category ~~4b~~4B listing indicates that the specific ~~waterbody segment~~AU is now meeting standards, the ~~segment~~AU will be placed in Category 1.
- If Ecology determines that the pollution control program is making sufficient progress towards meeting tested standards, the ~~segment~~AU will remain in Category ~~4b~~4B.
- If a pollution control program is not making sufficient progress, then the listing will be returned to Category 5. Likewise, if a pollution control program has been declared completed and implementation has ended, but at that time or later the ~~waterbody segment~~AU is again shown to be impaired, then the ~~segment~~AU will be returned to Category 5.

Category 4C~~c~~. ~~Segment is~~ Impaired by a Non-Pollutant

~~Segments~~AUs are placed in this category when the failure to meet the applicable water quality standards is caused by a type of pollution that is not appropriately addressed through the TMDL process.

Some designated uses of ~~a waterbody segment~~an AU may be impaired due to aquatic habitat degradation that does not cause an exceedance of a pollutant criterion. When data show that ~~a waterbody segment~~an AU is impaired for such reasons, it will be placed in the *Impaired by a*

Non-Pollutant category. A Category 5 listing is not required because a TMDL would be ineffective in addressing this type of water quality problem.

Under federal statute, pollution is defined as the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water (CWA sec. 502(19)). Most pollution is caused by pollutants such as toxic chemicals, waste material, nutrients, sediments, and heat. However, pollution can also be caused by factors that are not pollutants. Some examples of non-pollutants that nonetheless cause impairment are:

- Physical habitat alterations.
- Physical barriers to fish migration, such as ~~dams and~~ culverts.
- ~~Loss of habitat due to invasive~~Invasive exotic species.
- Flow alterations, including ~~low flows and flashier systems~~anthropogenic dewatering or other hydrological alterations.
- ~~Impaired biologic communities~~Degraded biological integrity, when a pollutant does not contribute to the impairment ~~is not linked to a specific pollutant~~.

TMDLs are designed to allocate the input of pollutants among sources. In the case of non-pollutants, the cause of the impairment cannot be allocated, so the TMDL process is not appropriate. Other State and federal ~~requirements, including other applications of the state water quality standards and other requirements to satisfy those standards, may apply.~~programs are more appropriately designed to resolve pollution impairments (for example culvert replacement programs or invasive species prevention programs).

~~———~~A determination of impairment can be based on either numeric or narrative information. ~~If the source of impairment is unidentified but is suspected to be from pollution, instead of a pollutant, the segment will be placed in this category. For example, if bioassessment data indicate an impaired biological community, and pollutant monitoring of suspected pollutants does not show impairment by a pollutant, the waterbody segment will be placed in Category 4c indicating that habitat-related impairment is suspected.~~

~~———~~

~~Water bodies will be placed in Category 4c when data and information are submitted that demonstrate a use is not being protected and the impairment cannot be fixed by a TMDL. Because the impairment is not being caused by a pollutant,~~In cases where narrative information is used to demonstrate impairment, it must be submitted in accordance with this policy (see ~~Section 6~~Part 1E, "Assessment of Information using Narrative Standards"). Waters will be removed from Category ~~4c~~4C when information is submitted that demonstrates the impairment has been corrected, or that the listing was made in error.

Category 5. Segment is on 303(d) List

~~Waterbody segments~~This category constitutes the 303(d) list that EPA will review and approve or disapprove pursuant to federal regulations. In accordance with EPA 2006 Integrated Report Guidance, "AUs must be placed in Category 5 when, based on existing and readily available data and/or information, technology-based effluent limitations required by the Act, more

stringent effluent limitations, and other pollution control requirements are not sufficient to implement an applicable water quality standard and a TMDL is needed. 40 CFR 130.7(b)(1)."

AUs impaired by a pollutant as determined by the methodology described in this policy, or by well-documented narrative evidence of impairment, will be placed in Category 5. ~~This category will be submitted to EPA as the 303(d) list. A waterbody segment~~An AU may also be placed in Category 5 if it is currently meeting standards, but credible ~~trend~~data and information ~~and data collected through a valid statistical methodology~~ indicates that the ~~water body~~waterbody is not expected ~~not~~ to meet applicable water quality standards by the next ~~assessment~~WQA cycle. ~~Waterbody segments on~~AUs in Category 5 will need a TMDL, pollution control program, or other actions to bring the water into compliance with the water quality standards.

Delisting from Category 5

In general, once an AU qualifies for Category 5, it can only move out of Category 5 to Category 4A or 4B if a TMDL or other cleanup method is in place. It can also move to Category 1 directly if it qualifies for Category 1 in accordance with this policy. Exceptions to this general rule are described in the WQA considerations for specific pollutant parameters found in Parts 2 and 3 of this document.

~~6. Assessment Methodology~~ [MOVED TO PART 1E "ADDITIONAL INFORMATION ON DATA SUBMITTALS" & EDITED]

~~The purpose of the assessment is to determine the status of the State's water quality based on water quality standards and available data. The results will be used to meet CWA reporting requirements for Section 305(b) and to develop the Section 303(d) list. The 303(d) list helps determine priorities for TMDL scheduling and development. The Assessment will be based on available data and information that meets the requirements of this policy. Generally numeric and narrative data will be used for assessment purposes, depending on the parameter. Modeled data that meet QA procedures will be allowed when the status of water quality is being determined in relation to natural conditions.~~

~~Newly submitted data will be added to previously assessed data that are less than ten years old. Data older than ten years will be used only if no more recent data exists to conduct the assessment. Older data must also meet all QA requirements at the time of submittal, and will be compared against the current policy to make the assessment decision. Data older than ten years will be used whenever necessary to determine historical natural conditions.~~

~~Listings from previous assessment cycles will not be reassessed according to this policy unless more recent information associated with the parameter and waterbody segment is made available.~~

~~Only one parameter value per day per segment will be used in the Assessment. Replicate samples taken at the same time and location will be averaged. Otherwise, the highest measurement per day will be used, except for dissolved oxygen for which the lowest measurement will be used, and except for pH for which the highest or lowest measurement will be used as applicable.~~

~~Use of Non-Detect Samples~~

~~It is appropriate to use non-detect values for assessment purposes when the detection limit is less than the criteria (e.g. bacteria). In these situations, we can be assured that the non-detect samples are meeting the water quality standard. However, if the detection limit is greater than the criteria, it is not appropriate to use non-detect samples (e.g. some toxics). In these situations, a non-detect sample may, or may not show compliance with water quality standards. For calculating a geometric mean using non-detect samples, where zero cannot be used, a value should be chosen so as not to bias the geometric mean high or low.~~

~~Determination and Use of Field Replicate Samples~~

~~Field replicate sample values in EIM are averaged together if they are identified as field replicates. Additionally, for some parameters, samples collected at the same location within a specified time frame may be averaged. Bacteria samples are averaged if the samples are collected in the same location, less than 15 minutes apart. Bacteria samples are averaged within 15 minutes to reduce bias in situations where an additional sample(s) was collected at a different time of the same day. Dissolved oxygen, pH, and temperature samples are averaged if they are~~

collected in the same location, less than 5 minutes apart. The resulting calculated value is treated as a single sample in the assessment. The shorter 5-minute timeframe is used for certain parameters because:

1) These values can change rapidly, and averaging measurements that are more than 5 minutes apart could potentially mask a criteria excursion.

2) Continuous measurements are sometimes intentionally collected at 5, 10, or 15 minute intervals to illustrate actual changes in water quality.

Comparison of Data to a Water Quality Criteria Expressed as an Average

In cases where criteria are expressed in the standards as averages over a specified time period (e.g., 24-hour averages for the acute criteria for many metals) all samples collected from a representative site are averaged to assess compliance with the criteria during the specified averaging time. In cases where only one grab sample is available to represent the specified averaging period then that sample is used to represent the average concentration over the averaging period. These instantaneous measurements will be assumed to represent the averaging periods specified in the State's surface water quality standards for both acute and chronic criteria.

Assessment of Data and Information Using Numeric Standards

Assessment decision requirements for specific pollutant parameters are described in Section 8. Section 8 includes the basis for assessment decisions based on data requirements, general Assessment information, and the category determination process for each these parameters: Bacteria, bioassessment, contaminated sediments, dissolved oxygen, pH, total phosphorus (in lakes), temperature, total dissolved gas, toxic substances, and turbidity.

Assessment of Information using Narrative Standards

The Assessment of water quality can be based on narrative information. A segment will be placed in Category 5 on the basis of violating narrative standards relating to pollutants when the information regarding that waterbody segment includes both of the following:

- Documentation of environmental alteration related to deleterious chemical or physical alterations, such as nutrients or sediment deposition, is measured by indices of resource condition or resource characteristic or other appropriate measure.
- Documentation of impairment of an existing or designated use is related to the environmental alteration on the same waterbody segment or grid.

Narrative information regarding non-pollutant impairments will be assessed in the same manner for possible placement in Category 4C *(Impaired by a Non-Pollutant)*.

~~7~~1G. Other Assessment Considerations

Natural Conditions

~~Waterbody segments~~In accordance with EPA's Integrated Reporting Guidance (July 2005), states are not required to place waterbody segments into impaired categories when it is determined that the exceedance of standards is due solely to non-anthropogenic sources. AUs with data indicating impairment will be placed in Category 5 unless Ecology determines that ~~the exceedance of water quality standards is due to natural conditions or processes. Segments will be placed in Category 5 when~~ human activities do not cause~~, or have a strong potential to cause, significant impacts in addition to natural conditions~~ or contribute to exceedances of the standards.

A determination regarding natural conditions will require information and data to validate that the condition~~, with no presumption either way.~~ is not caused by human sources. Reviews to determine that exceedances are due to non-anthropogenic sources involve the examination of all available data from the site in question (including historic data older than ten years), comparison to an appropriate reference site (if applicable), and professional judgment based on experience working in the field of freshwater and marine monitoring.

If data or information is available to determine that the condition is not from human sources, the exceedance will not be considered out of compliance with the water quality standards, and a case will be made that it is due to natural conditions, qualifying the AU for Category 1. A decision to place ~~a waterbody segment~~an AU in Category 1 because the impairment is from natural conditions will require, at a minimum, identification of a likely natural source or process sufficient to produce the ~~impairment~~condition and information to support that there are no human impacts or none in excess of the allowable limits. ~~The~~ If there is insufficient information to determine the level of human influence, then Ecology will assume that human influences have contributed to criteria exceedances and that the contribution is measureable over natural conditions. In the absence of conclusive information about the natural condition of a waterbody, the AU will remain in Category 5 until further information or data can be used to justify a change in the category determination, or until a TMDL or other pollution control plan is approved. Follow-up investigation (e.g. TMDL study) will be needed to more fully characterize the extent of human influence.

Assessment of natural conditions may include ~~well-reasoned~~ best professional judgment, but this must be accompanied by information that supports the determination. ~~Pristine wilderness~~Wilderness areas or other areas with no significant human impact will generally be assumed to represent natural conditions. Placement of ~~waterbody segments~~AUs in Category 1 due to natural conditions do not need to meet Category 1 requirements described in the specific parameter sub-sections under ~~Section 8~~Parts 2 and 3.

~~State water quality standards for temperature and dissolved oxygen allow a small increment for human actions when the measurements exceed the criteria due to natural conditions (WAC 173-201A-200(1)(d)(i) and 173-201A-210(1)(d)(i)). The designation of a water body as impaired or as exceeding a water quality criterion for these two parameters due to natural conditions requires~~

~~a systematic review of available data and the application of best professional judgment of Ecology staff. Reviews involve the examination of all available data from the site in question (including historic data older than ten years), comparison to the most appropriate reference site (if available), and the application of professional judgment based on experience working in the field of freshwater and marine monitoring.~~

~~If data or information is available to determine that the human increment is below the threshold, the exceedance will not be considered a violation, and a case will be made that it is due to natural conditions, qualifying the waterbody segment for Category 1. The presence of common large-scale physical processes in marine waters~~In marine waters, the presence of common large-scale physical processes, such as upwelling, circulation, and thermal heating effects, presents naturally occurring situations that ~~would~~may override the ability of sufficient human influences to produce exceedances. In these cases, Ecology staff will use historic data and best professional judgment to determine that the human influences are significant or not. For marine ~~water bodies~~waterbodies that have exceedances of criteria that are ~~clearly~~likely due to natural conditions, the ~~waterbody segment~~AU will be placed in Category 1. For ~~water bodies~~waterbodies that appear to have natural conditions sufficient to override human influences, but the information is not conclusive, the ~~waterbody segment~~AU will be placed in Category 2. In the absence of specific data to determine whether the exceedance is above or below the threshold allowance, the ~~waterbody segment~~AU may be placed in Category 5 or Category 2~~, depending on available historic data and the best professional judgment of Ecology staff~~. The subsequent TMDL or other analysis will further determine the extent of human influences.

~~Assessment of Water bodies within a TMDL Boundary~~ [MOVED TO PART 1F. "CATEGORY 4A" & EDITED]

~~When a TMDL is developed because one or more Category 5 listings within the watershed boundary indicate impairment, the TMDL applies to all water bodies within the boundary of the TMDL. The TMDL is an in-depth study that addresses which waters are violating standards, which waters are contributing to downstream violations, and what needs to be done for all waters within the TMDL boundary to be brought back into compliance with the standards, natural conditions, or other objectives.~~

~~*Assessment of Data during TMDL Development*~~
~~Data generated during the development of a TMDL should not be used for the Assessment until the dataset is complete for the TMDL. This avoids conducting an assessment of incomplete datasets. Monitoring data submitted independent of the TMDL study that is within a TMDL boundary needs to also be considered within the context of the TMDL. TMDL staff should consult with Assessment staff regarding the adequacy of the additional data to make a category determination. If the dataset is determined to be incomplete or inconclusive for determining the appropriate category, the associated segments will be placed in Category 3 and reassessed after the TMDL has been approved by EPA.~~

~~*Assessment of Data after TMDL is Approved by EPA*~~
~~Once the TMDL is completed and approved by EPA, all monitored waters in the TMDL boundary that have a load or wasteload allocation associated with them are placed in Category~~

4a. During implementation of the approved TMDL, monitoring data will continue to be collected to help determine if the TMDL is effectively bringing the waterbodies back into compliance with the water quality standards or TMDL objectives.

The completion of a TMDL provides additional information on contributions of pollutants from waterbody segments within the watershed and what is needed to bring a water body or watershed back into compliance with the standards. Therefore, Assessment listing decisions within a TMDL boundary need to consider the TMDL information in addition to the monitoring data. Determining the appropriate category for a waterbody segment within an approved TMDL boundary needs to be performed jointly by Assessment staff and regional TMDL staff to ascertain whether a new or changed assessment category is appropriate based on both data and TMDL information. The following should be considered when moving waterbody segments in or out of Category 4a during implementation of an approved TMDL.

- *Moving a proposed Category 1, 2, 3, or 5 listing to Category 4a*. When new data are assessed for a waterbody segment within an approved TMDL boundary, Assessment staff will consult with TMDL staff responsible for the TMDL to determine that a load or wasteload allocation exists for that segment. If the segment has a load or wasteload allocation associated with it, the segment will be placed in Category 4a (*Has a TMDL)*. If not, the segment will be placed in the appropriate category based on data results alone.

1.A. *Moving an existing Category 4a listing to a Category 1*. It is not always necessary to fully complete all implementation activities within a TMDL boundary before Category 4a listings within the TMDL can move to Category 1. If new data are assessed for a waterbody segment within an approved TMDL boundary and the data indicates that the water body is meeting tested standards, the segment may be moved from Category 4a to Category 1 under certain circumstances:

4.1. The sampling effort is from more recent reporting periods that were conducted during the seasonal or critical condition period identified in the TMDL.

5.2. Best Management Practices (BMP) implementation is occurring where appropriate.

6.3. Previous pollution sources in the vicinity of the monitoring location are not likely to contribute to future impairments at downstream locations.

Assessment staff will consult with regional TMDL Leads to share initial data assessment results and to verify that the TMDL is being implemented and there are not known sources in the vicinity of the monitoring location that would contribute to an impairment at a downstream location. Waterbody segments may be moved to Category 1 based on data if these conditions are satisfied. Moving waterbody segments within a TMDL boundary from Category 4a to Category 1 will not necessarily end further implementation of the TMDL. That will be determined by the terms of the TMDL.

If future monitoring data indicates impairment of a waterbody previously moved from Category 4a to Category 1, then the waterbody segment will be returned to Category 4a if Ecology determines that the applicable TMDL is active and appropriate for prescribing and scheduling the needed corrective actions. If not, the segment will be moved back to Category 5.

Listing Challenges and Other Situations

Ecology reserves the right to make ~~Assessment~~WQA decisions on matters not addressed by this policy, or in a manner not in accordance with this policy, as needed to address unusual or unforeseen situations. The ~~Assessment~~WQA decisions will be based on available information used in accordance with the water quality standards, credible data policies, and ~~the~~other relevant State and federal laws and regulations. Any listing decisions that deviate from methodologies described in this policy will be clearly described in the remarks section of the waterbody listing.

~~An objective of the listing policy is to establish which waterbodies need TMDLs. The decision to place a water body in a given category must be based on data that are representative of the water segment at the time of sampling. Water quality monitoring projects are usually based on objectives to determine the overall quality of the water but not always. There are some projects in which objectives are to study a localized or specific sub-basin of the surface water, such as at the location of a discharge pipe prior to complete mixing, or within a lake swimming beach during times of peak recreation use. The objective of the project must either match the objective of the listing policy or the project data may be pooled with other data that describe the overall condition accurately.~~

Requests for Reconsideration of Listing Decisions

At any time, interested parties may contact Ecology in writing to request that an existing ~~waterbody segment~~AU listing in any of the five categories be reassessed under the listing factors of this policy. The request must include the following:

- The reason(s) the listing is inappropriate and how the policy would lead to a different outcome~~.~~ (for example moved to another category).

- The data and information necessary to enable Ecology to conduct the review.

The results of ~~assessment~~WQA reviews which occur between scheduled ~~assessment~~WQA cycles will become part of the next scheduled draft ~~Assessment~~WQA report to EPA.

Ecology will, in consultation with EPA, correct any errors identified in the 303(d) list or the overall ~~Assessment~~WQA as soon as Ecology is aware of the error, without waiting for the next ~~Assessment~~WQA cycle. Errors may include misidentified ~~segments~~AUs, misreading of the data, and similar errors. This does not apply to requests to change ~~an Assessment~~a WQA decision based on new data prior to the next ~~Assessment~~WQA cycle nor to disagreements with Ecology's judgment in making ~~an Assessment~~a WQA decision. Changes made between listing cycles may not be available until the next public review of the ~~Assessment.~~

1H. Prioritizing TMDLs

The ~~waterbody segments~~AUs placed in Category 5 will be prioritized by Ecology's Water Quality program ~~by engaging in an annual project scoping process that will determine the upcoming fiscal year projects, based on the following primary criteria:~~

- ~~Risk~~and submitted to ~~threatened and endangered species.~~
- ~~Public health threats from toxic chemical pollution.~~
- ~~Where water quality based permit limits need~~EPA as part of the WQA package to ~~be established or lowered~~meet approval requirements for ~~municipalities' publicly owned treatment works and for industrial treatment plants.~~
- ~~Vulnerability of water bodies to degradation.~~
- section 303(d)~~Risks to public health, including drinking water.~~

~~1.~~ ~~Severity~~ of the ~~pollution.~~Clean Water Act.

Ecology takes a watershed approach to TMDL development so that water quality impairments for multiple pollutants are addressed ~~in a holistic fashion. New TMDL development will occur in each Ecology region based primarily on the prioritization criteria above, and also on their ability to start new projects and available resources for conducting the technical studies~~holistically. Ecology recognizes that partnerships at the local level are vital to ensure success of the TMDL. To that end, Ecology is committed to engaging stakeholders, tribes, local organizations, and other members of the public in establishing TMDL priorities that take into account local perspectives and priorities, especially where local resources will be crucial for the success of implementing the TMDL.

To ensure consistency statewide and enhance public participation in the TMDL prioritization process, Ecology will hold an annual statewide public meeting to present its proposed list of TMDLs to start in the next two years. Ecology will seek feedback from the public and take comments on the proposed list. Based on this feedback, Ecology will revise the list as appropriate, and prepare a response to comments. It is important to note that there may be some years when no new TMDLs are proposed because of resource constraints, such as limited staffing to start new projects or limited resources to conduct the technical studies.

Criteria to prioritize TMDLs as higher priority include the following:

- Severity of pollution problem
- Risks to public health

~~The Water Quality Program also conducts a 5-year strategic planning process (which began in 2011) to scope regional projects and outline the Water Quality Program's ability to meet the TMDL production targets that address specific numbers of category 5 listings based on the prioritization criteria listed above.~~

- ~~Priorities for TMDLs and cleanup activities related to~~
- Waterbodies where a new or more stringent permit limit is needed for point sources
- Local support and interest in a watershed

For contaminated sediment listings in Category 5, sediment cleanup priorities will be set by Ecology's ~~TCP~~Toxics Cleanup Program in accordance with the sediment management standards at WAC 173-204.

Ecology provides formal assurances for forestry activities conducted under the state's forest practices regulations that affect TMDLs and their prioritization. In watersheds where forestry is the primary land use, Ecology considers developing TMDLs to be a low priority. For forested watersheds with a broader mixture of land uses, Ecology may prioritize developing TMDLs but relies on the state's forest practices rules to address any portion of the pollution which may be contributed by forestry activities. These Clean Water Act (CWA) Assurances, were established as a formal agreement to the 1999 Forests and Fish Report.

The state's forest practices rules were developed with the expectation that the stream buffers and other management prescriptions were stringent enough to meet state water quality standards, and provide protection equal to what would be required under a TMDL. To ensure the forestry rules are as effective as intended and directed by state law, a formal adaptive management program was established to assess and expediently revise the forest practices rules, as needed. The agreement to rely on the forest practices rules in lieu of developing separate TMDL load allocations or implementation requirements remains conditioned on maintaining an effective adaptive management program.

~~8~~PART 2. Specific ~~Submittal and Basis for Assessment Decisions~~ Assessment Considerations for Water Quality Criteria

In addition to the general requirements in Part 1, ~~Section 7, specific~~ requirements are described in the following ~~sub-~~sections of Part 2 that apply to data addressing specific water quality criteria. Requirements for sediment quality criteria are found in Part 3.

A. Bacteria
B. Benthic Biological Indicators
C. Dissolved Oxygen
D. pH
E. ~~Total~~ Phosphorus (Total) in Lakes
F. Temperature
G. Total Dissolved Gas
H. Toxics- ~~Substances~~Aquatic Life Criteria
I. Toxics-Human Health Criteria
J. Turbidity

2Aa. Bacteria

Designated Uses:	Water contact recreation Shellfish harvesting
Numeric Criteria:	WAC 173-201A-200 (2); WAC 173-201A-210 (3)
Narrative Standards:	WAC 173-201A-260 & -300
Unit of Measure:	Number of colony forming units per 100mL

Assessment Information and Specific Data Requirements

Fecal coliform and *Enterococcus spp*.data will be assessed by Ecology staff in the according to the following description:

Sample dataThe state water quality standards for bacteria include provisions for determining compliance based on either component of the two-part criteria:

1. A geometric mean component with a specified magnitude value, and
2. A "percent exceedance" component: Not more than 10 percent of all samples (or any single sample when less than ten sample points exist) exceed the specified magnitude value.

Data for bacteria will typically be assessed in 12-month reporting periods or in reporting periods that represent a distinct climatic regime of less than a year. A distinct climatic regime may be a certain season or certain months, in whatever manner is relevant to bacteriagrouped and to the water body. Ecology will determine the assessment periods, case-specific, based on local circumstances such as climate, weather, and associated bacteria data; otherwise, the assessment period will be consistent with the general evaluated by individual water year for the State, , which extends from October 1st of one year through September. Waters that have previously been assessed based on calendar 30th of the following year, as described in early versions of this policy, will not be reassessed unless new information indicates that these assessments would result in a change of the category determination.. Data from incomplete water years may be reserved for the next AssessmentWQA when further data will allow a geometric mean to be calculated for the entire water year. Ecology may also define a specified critical period or season in which the criteria need to be met, based on WAC173-201A, sections 200(2)(b)(i)&(210)(3)(b)(i). This period is typically defined through a TMDL study and brackets specific months or seasons in which bacteria levels are more prone to exceed criteria. Where a critical period applies, bacteria will be assessed for the entire water year as well as the critical period.

The state water quality standards include provisions for determining violations based on either a mean of bacteria values of a set of samples (geometric mean criteria) or the highest levels among the individual samples within that set (percent criteria). Violations are based on either of these provisions.

To reduce concerns of low bias when the data are later used to calculate a geometric mean, anA minimum of five data collection events are needed to calculate a geometric mean value, in

accordance with water quality standard recommendations in WAC 173-201A-200(2)(b)(i). No minimum sample size is required to evaluate the percent exceedance component of the criterion.

Only one value per day will be used in the WQA. An arithmetic mean value will be calculated from multiple data points collected in the same sampling event ~~and waterbody segment.~~for an AU. This averaging helps to reduce the effects of sample variability inherent in determining ambient bacteria concentrations at the time of sampling. The resulting single representative data point for the sampling event will represent the daily value ~~to be included in this assessment methodology.~~used to evaluate relative to the numeric criteria.

The bacteria evaluation relies upon data that was randomly collected. Data collection events designed to target high bacteria levels will misrepresent the proportion of samples that exceed the criteria. Therefore, Ecology will remove data from the evaluation whenever it is known to be from monitoring designed to target high bacteria levels.

The final category determination for an AU is based on the most recent data available that qualifies for a category (other than Category 3). For example, if an AU qualifies for Category 5 based on a previous water year dataset, and Category 1 based more recent data, then the AU will be placed in Category 1.

Agency advisories will also be used to directly assess the protection of designated uses. Specific details on category determinations for shellfish classification standards, swimming advisories, and the BEACH Program are included at the end of the Category Determinations section below.

In some cases, Ecology will allow alternate indicators of bacteria in freshwater when the data submitter is able to demonstrate that the indicator ~~can be used as a surrogate. For example, in some water bodies a strong correlation can be shown between fecal coliform and E. coli values. If this is demonstrated, Ecology will use the alternate indicator for assessment purposes~~is an appropriate surrogate. For example, *E. coli* bacteria values can be used to determine non-compliance with the fecal coliform criteria because *E. coli* is a subset of the group of bacteria referred to as fecal coliforms. For the same reason, however, *E. coli* values cannot be used to show compliance with the fecal coliform criteria.

~~When collecting data in or around small sensitive areas such as swimming beaches, it is recommended that multiple samples be collected throughout the water body during each visit. During peak use, a lake swimming beach may be affected by numerous temporary sources of bacteria associated with human swimmers, including disturbed sediments. When bacteria samples are collected in lake swimming areas without significant water exchange, and it is determined that the swimmers themselves are the primary source of bacterial pollution, this data may be excluded from the Assessment. Ecology may require data from outside the active primary contact period to ensure that other sources are not causing exceedances of the recreational criteria.~~

~~Bacteria criteria may vary depending on salinity concentrations in brackish waters of estuaries. In these cases, the method to determine what standards apply is described in WAC 173-201A-260(3)(e). If information is not available to determine the delineation between marine and~~

~~freshwater criteria, then the more stringent of the two criteria will apply as described in WAC 173-201A-260(3)(c).~~Ecology reserves the right to apply the most current version of the state water contact criteria. Although the general methodology described in this section wouldn't change, the numeric criteria applied would differ.

~~*Agency Advisories*~~

~~Fish, shellfish, and swimming advisories issued by the Department of Health (DOH) or local health departments, or similar advisories from other agencies based on credible monitoring programs under the federal Food and Drug Administration rules or the EPA BEACH Act will be used to directly assess the protection of designated uses.~~

~~Waterbody segments covered in whole or in part by a fish, shellfish, or swimming advisory will be categorized as follows:~~

- ~~If the risk assessment parameters or other assumptions used by the agency issuing the advisory are cumulatively less or no more protective than those incorporated into the state standards, the segment will be placed in Category 5 for the specific parameter.~~
- ~~If the parameters or assumptions used in issuing the advisory were based on more protective standards (that is, the advisory would be triggered by a less severe water quality problem), the segment will be placed in Category 2.~~
- ~~Closure or downgrades of approved shellfish beds by DOH that are based on assessment of actual fecal coliform data will be sufficient to place all marine grids overlapping the affected shellfish beds in Category 5 for fecal coliform.~~
- ~~Swimming Closures or Advisories that last longer than 30 cumulative days in a one year period will be placed in Category 5.~~

~~The advisory must be based on fish, shellfish, swimming, sediment, or water column data specific to the waterbody segment. Ecology will defer to the issuing agency's assessment prompting the advisory. Listings will not be based on shellfish closure zones around wastewater treatment plant outfalls, marinas, port facilities, or similar facilities unless the ambient bacteriological water quality standard is exceeded, nor on advisories for marine biotoxins, nor on geoduck bed closures by the state Department of Natural Resources. Listings will be based on advisories for short-term conditions, such as storm events, if the conditions apply to 30 or more consecutive calendar days in a year.~~

~~*Use of Beach Environmental Assessment, Communication, and Health (BEACH) Program Enterococcus spp. Data*~~

~~The state water quality standards include bacteria criteria for Enterococci for secondary water contact recreation in marine waters. However, most swimming beaches fall into the primary contact recreation category defined by the *Water Quality Standards for Surface Waters of Washington State* as "activities where a person would have direct contact with water to the point of complete submergence including, but not limited to, skin diving, swimming, and water skiing." *Enterococcus spp.* data from the State's BEACH Program is included in the Assessment for marine primary contact waters because these waters must at least meet the secondary contact recreation bacteria criteria.~~

Category Determinations [NOTE: CATEGORY DETERMINATIONS HAVE BEEN REVERSED, FROM CATEGORY 5 TO CATEGORY 1, AND EDITED]

More recent data outweighs older data in qualifying an AU for a given category. For example, if the AU qualifies for Category 5 based on earlier years but are followed by subsequent years that qualify for Category 1, then the AU will be placed in Category 1. The exception is that years with insufficient data to evaluate compliance do not outweigh prior years that qualify for another category. Once a listing is placed in Category 5, 4A, or 4B, it can only move out of the category by qualifying for Category 1.

Category 5 ~~Determination~~

An AU will be placed in Category 5 when:

- The geometric mean component of the applicable criterion is not met in a single water year.

OR

- The "ten percent exceedance" component of the criterion for primary or secondary contact recreation is not met in a single water year if there are at least two samples exceeding the criterion magnitude.

Category 5 determinations based on agency advisories are described at the end of this section.
~~A minimum of five samples is required to support placement in Category 5 based on geometric mean criteria. Fewer than five samples may support placement in Category 5 based on the percent criterion provided that two or more samples exceed the criterion.~~

~~When five or more sample values from a given waterbody segment (within the assessment period described above) are available, the segment will be placed in Category 5 if either of the following two assessment methods result in an exceedance of primary or secondary contact recreation criteria:~~

1. ~~The calculated geometric mean of all samples[1] from a waterbody segment exceeds the geometric mean criterion applicable to that waterbody as described in the state water quality standards.~~

2. ~~A minimum of two sample values from a waterbody segment exceed the percent criterion for primary or secondary contact recreation.~~

   ~~AND~~

   ~~More than ten percent of all sample values1 exceed the percent criterion for primary or secondary contact recreation.~~

~~When fewer than five sample values from a given waterbody segment are available, the segment will be placed in Category 5 only if assessment method 2 (above) results in an exceedance. The calculated geometric mean assessment method will not be applied to datasets of fewer than five~~

[1] ~~Only one value per day is used in the assessment~~

~~sample values, in accordance with water quality standard recommendations in WAC 173-201A-200(2)(b)(i).~~

~~Waterbody segments that fail to meet shellfish classification standards for more than 30 days in a calendar year, as described in the DOH Annual Shellfish Growing Area Review, will be placed in Category 5.~~

~~For BEACH Enterococcus spp. data, the seasonal geometric mean will be calculated for the entire season and compared to the secondary contact recreation criteria in marine waters.~~

~~Waterbody segments will be placed in Category 5 based on Agency Advisories as described in that section (see above under "Agency Advisories").~~

Category 4 ~~**Determination**~~

An AU will be placed in Category 4A when EPA has approved a TMDL for bacteria.

An AU will be placed in Category 4B when the bacteria problem is being addressed by an active pollution control program that meets EPA's qualifications for 4B designation. For example, an active Pollution Identification and Control Program or DOH closure response plan may be used to qualify for a 4B designation.

~~A waterbody segment will be placed in Category 4a when EPA has approved a TMDL for bacteria. Waterbody segments will be placed in Category 4b when Ecology determines that a pollution control program for bacteria is in place and meets 4b reqruiements. Waterbody segments that have a DOH closure response plan in effect and that have been listed in Category 5 based on DOH advisories will be reviewed for a possible 4b determination. Category 4c does not apply to pollutant parameters.~~

Category 3 ~~**Determination**~~

An AU will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's WQA database for future use. As additional data and information become in future listing cycles, Ecology will again assess all available data to make a new category determination according to this policy.

Category 3 determinations based on agency advisories are described at the end of this section.

~~A waterbody segment will be placed in Category 3 when the available data are insufficient for making any other category determination. This information will be maintained in Ecology's Assessment database for future use. In primary contact recreation marine waters, if the available *Enterococcus spp.* data indicates no excursions beyond the criteria, but is lacking sufficient fecal coliform data to be placed in Category 1, the segment will be placed in Category 3. As additional data and information become available, Ecology will again assess all available data to make a new category determination according to this policy.~~

~~Waterbody segments that are within the classification standards as described in the DOH Annual Shellfish Growing Area Review, AND have less than 10 samples with no exceedances of either criteria, will be placed in Category 3.~~

Category 2 ~~Determination~~

An AU will be placed in Category 2 when only one water year does not meet the "percent exceedance" component of the applicable criterion and there are less than two exceedances in the water year.

Category 2 determinations based on agency advisories are described at the end of this section.

~~A segment will be placed in Category 2 when at least one sample value exceeds the percent criterion based on either primary or secondary contact recreation criteria and the segment is not otherwise placed in Category 1 or 5.~~

~~Waterbody segments that are threatened with a downgrade classification or that fail to meet classification standards for less than 30 days in a calendar year as described in the DOH Annual Shellfish Growing Area Review will be placed in Category 2.~~

Category 1 ~~Determination~~

An AU will be placed in Category 1 in one of two ways:

The geometric mean and the percent exceedance components of the applicable criteria are met in each of two water years, based on ten or more samples from each of those years.

- If any critical period has been identified by Ecology, the criteria must also be met during this period.
- The two years qualifying for Category 1 do not need to be consecutive as long as there is no year between them in which the criterion is not met; nor do the two years need to be the two most recent as long as there is no subsequent year in which the criteria are not met.

OR

An AU may be placed in Category 1 based on data from a single water year under the following circumstances:

- The AU has an approved TMDL (Category 4A) or alternative pollution control program (Category 4B) that is being actively implemented.
- Ecology has defined a critical period for the AU during which:
  - There are at least five sample values from the critical period.
  - The samples meet the geometric mean component of the applicable criterion and the percent exceedance component, and/or the applicable TMDL targets.
- The qualifying year does not have to be the most recent year provided that there are no more recent data for which the criteria are not met.

Category 1 determinations based on agency advisories are described at the end of this section.

~~A waterbody segment will be placed in Category 1 when (1) at least ten samples meeting the criteria are available for the most recent data collection year from a reporting period as defined above, and (2) both the geometric mean criterion and the percent exceedance criterion are met.~~

~~Waterbody segments that are well within the classification standards as described in the DOH Shellfish Growing Area Annual Report AND have at least 10 samples that do not exceed either criterion, will be placed in Category 1 unless there is more recent data indicating that the use of water contact recreation is impaired.~~

~~Category 1 determinations based solely on *Enterococcus spp*. data, can only be applied to marine waters designated for secondary contact recreation. Fecal coliform data are required to make a category 1 determination in primary contact waters in accordance with the bacteria standards for that recreational use class, (WAC 173-201A-200(2)(b)).~~

~~Data eligible to result in a change from Category 5 to Category 1 must include a sampling effort designed to target the critical period(s) (if applicable) in which exceedances of the criterion are more likely to occur in the waterbody segment. Sampling during the critical period must show that the segment is meeting the Category 1 requirements for the water quality criteria within that critical period. To ensure that improvements in water quality have been achieved, Ecology may also require narrative information on investigative and/or remedial activities that have occurred, such as; septic system repairs, the formation of shellfish protective districts, construction of pet waste containers, or other appropriate activities.~~

~~Waterbody segments previously placed in Category 5 based on DOH advisories can be moved to Category 1 if new DOH Shellfish fecal coliform data show no exceedances of the criterion and no data are submitted from other groups indicating otherwise. If available data from other groups still show exceedances of the criterion, the segment will be moved to Category 2.~~

~~Data from more recent reporting periods available may allow a previous Category 2 listing to be moved to Category 1 if, (1) at least ten samples are available from the most recent data collection year and represent a reporting period as defined above, and (2) both the geometric mean criterion and the percent criterion are met. Single samples may individually exceed the percent criterion value provided that no more than ten percent of the sample set exceeds the criterion.~~
~~Exceptions to the above data requirements for listing segments in Category 1 based on fecal coliform data may be made under certain circumstances. When a waterbody segment is part of a detailed pollution study, such as a TMDL, Ecology may determine that an alternative set of sampling values is sufficient for determining that a waterbody is meeting tested standards and can be listed in Category 1. A minimum of at least five samples are necessary within the identified "critical condition" period for calculating a geometric mean for bacteria. Multiple years of data may be necessary in these situations. See Section 7, "Assessment of Water bodies within a TMDL Area" for further details on moving listings within a TMDL to Category 1.~~

Category Determinations Based on Agency Health Advisories

Category Determinations using Department of Health Shellfish Program Data

The Washington Department of Health (WDOH) classifies shellfish growing areas based on their sanitary conditions under the direction of the U.S. Food and Drug Administration (FDA). The WDOH classification methods are derived from the National Shellfish Sanitation Program Guide

for the Control of Molluscan Shellfish. The bacteriological quality of marine water samples collected from an Approved growing area must satisfy both parts of the following standard:

The concentration of fecal coliform bacteria, the indicator organisms, cannot exceed:

- A geometric mean of 14 organisms per 100 milliliters (mL); and
- The estimated 90th percentile cannot exceed 43 organisms per 100 mL if sampling under the systematic random sampling plan. If sampling where point sources of pollution may impact the growing area, not more than 10 percent of the samples can exceed 43 organisms per 100 mL.

A minimum of 30 samples is used for determining compliance with the geometric mean criterion and may include up to 5 years of data. However, in accordance with the surface water quality standards, Ecology assesses the ambient bacteriologic conditions of commercial and recreational shellfish harvesting area based on a maximum 12 months duration for calculating a geometric mean [WAC 173-201A-210(2)(b)(ii)].

This differing temporal range (five years vs. one year) for determining compliance with the geometric mean criterion, may in some cases, create a disparity between WDOH and Ecology impairment decisions. Furthermore, when assessing data for Conditionally Approved growing areas, WDOH removes data collected under specific conditions such as storm events. Ecology includes these data when collected in the course of a random sampling plan. Sampling designed to target high bacteria levels are not used to assess ambient conditions.

As required by the surface water quality standards, shellfish growing areas approved for shellfish harvest using the WDOH assessment methods, are considered fully supporting the shellfish harvesting use. In accordance with this provision, Ecology will consult with WDOH on WQA determinations using the shellfish program sampling data. In general, a Category 5 listing will be administratively moved to Category 2 upon consultation with WDOH. Similarly, Category 1 determinations in shellfish areas currently not approved for harvest due to a WDOH assessment of bacteriologic data, may be moved to Category 3 upon consultation with WDOH.

In the event of any other WQA discrepancy of shellfish harvesting areas, Ecology will defer to WDOH and administratively modify the WQA as necessary to align with WDOH classifications.

Advisories based on Swimming Closures or Short Term Conditions

Swimming advisories based on bacteria data will be placed in Category 5 if the closure is for 30 or more consecutive calendar days in at least two different years within the ten year data window.

When collecting data in or around small sensitive areas such as swimming beaches, it is recommended that multiple samples be collected and that sample collection is not limited solely to the primary swimming area. During peak use, a lake swimming beach may be affected by numerous temporary sources of bacteria associated with human swimmers, including disturbed sediments. When bacteria samples are collected in lake swimming areas without significant water exchange, and it is determined that the swimmers themselves are the primary source of bacterial pollution, this data may be excluded from the WQA. Ecology may require data from

outside the active primary contact period to ensure that other sources are not causing exceedances of the recreational criteria.

Use of Beach Environmental Assessment, Communication, and Health (BEACH) Program *Enterococcus spp*. Data

The state water quality standards include bacteria criteria for enterococci for secondary water contact recreation in marine waters. However, most swimming beaches fall into the primary contact recreation category defined by the *Water Quality Standards for Surface Waters of Washington State* as "activities where a person would have direct contact with water to the point of complete submergence including, but not limited to, skin diving, swimming, and water skiing." Swimming advisories from the State's BEACH Program based on *Enterococcus spp.* data are included in the WQA for marine primary contact waters because these waters must also meet the secondary contact recreation bacteria criteria.

- For BEACH *Enterococcus spp*. data to qualify for Category 5, the seasonal geometric mean will be calculated for the entire season and compared to the secondary contact recreation criteria in marine waters.
- Category 1 determinations based solely on *Enterococcus spp.* data, can only be applied to marine waters designated for secondary contact recreation. Fecal coliform data would be required to make a Category 1 determination in primary contact marine waters in accordance with the bacteria standards for that recreational use class (WAC 173-201A-200(2)(b)).
- In primary contact recreation for marine waters, if the available *Enterococcus spp.* data indicates no exceedances beyond the criteria, but is lacking sufficient fecal coliform data to be placed in Category 1, the AU will be placed in Category 3.

Helpful Documents

- EAP030 - Fecal Coliform Sampling
- EAP034 (Publication #17-03-207)- Collection, Processing, and Analysis of Stream Samples

~~b~~2B. ~~Bioassessment~~Benthic Biological Indicators

Designated Uses:	Aquatic life
Narrative Standards:	WAC 173-201A-260 & -300

Assessment Information and Specific Data Requirements

Assessments based on multi-metric, community-level biological indicators provide direct measures of the cumulative response of the biological community to multiple types of stressors. EPA Integrated Report guidance (U.S. EPA, 2005) conveys that states should include bioassessment methodologies in the data and information they evaluate in developing their 303(d) lists and 305(b) reports. This guidance stipulates that states should identify AUs in Category 5 using bioassessment data even if the specific pollutant causing the impairment has not been identified.

Ecology primarily relies upon a multi-metric benthic index of biotic integrity (B-IBI) methodology to identify impairments of the aquatic life use. The B-IBI model is based on the response of community attributes relative to gradients in environmental attributes. For more information on the B-IBI model, refer to the helpful documents listed at the end of this section. Past assessments also used the River Invertebrate Prediction and Classification System (RIVPACS) multivariate model; this model has not been recently employed, however, as with any credible data and information on aquatic life use support, the results of this model remain usable for WQA purposes. Ecology may also use other types of bioassessment data and information (e.g. for periphyton communities) provided that the data meets data credibility requirements and guidelines for listing based on section 1E "Information Submittals Based on Narrative Standards".

Ecology relies upon a numeric threshold to indicate whether or not the biological integrity (e.g. diversity and abundance) of an aquatic life community is degraded. The accepted scientific practice is to compare the similarity between standardized community metrics observed at an assessment site to the community metrics expected to occur at the site. The expected attributes are based on data from reference sites that are minimally or least affected by human activities.

Since benthic communities are significantly influenced by both water quality and habitat conditions, bioassessment scores that are depressed relative to a set of reference sites are indicative of water quality and/or habitat degradation, but in some cases, indicate natural environmental constraints upon the biological community. A stressor identification analysis is typically required to identify the most probable causes of low bioassessment scores. Bioassessment data based on the B-IBI model will be used to determine if the bioassessment scores are indicative of water quality and/or habitat degradation, and if so will be placed in Category 5 as "Degraded Biological Community-cause unknown." Category 5 listings based on B-IBI data will not result in permit limitations or wasteload allocations because a pollutant has not been identified. A stressor identification analysis will first need to occur in order to identify pollutants or habitat impairments that are causing the community to be degraded.

Evaluating Bioassessment Data based on B-IBI

The following procedures will apply to assessing bioassessment data for use in the WQA:

- Benthic macroinvertebrate community data needs to be collected and reported in accordance with the *Standard Operating Procedures and Minimum Requirements for the Collection of Freshwater Benthic Macroinvertebrate Data in Streams and Rivers. (Ecology SOP EAP073*) in order to be used in the WQA. This applies only to data collected after 2012, when the SOP was enacted. B-IBI data collected using alternative protocols may be used in the WQA provided that the sampling and analysis methodology is at least as rigorous as the Ecology SOPs and results in data to which the B-IBI model can be applied.
- B-IBI data from monitoring studies will only be used if the following are met:
    - Data must be collected within the index period that matches Ecology's reference sites, from July through October.
    - Data must be collected from a collection site that is a minimum of 8 square feet.
    - Data must be analyzed by labs with certified taxonomists in accordance with industry standard QA/QC protocols.
    - Taxonomy of organisms in samples should be identified to fine taxonomic resolution. More information can be found: Pacific Northwest Aquatic Monitoring Partnership (PNAMP); Northwest Standard Taxonomic Effort (NWSTE), https://www.pnamp.org/document/5210, January 2013
- Sample counts: The goal is to evaluate a benthic macroinvertebrate assemblage based on a sample containing at least 500 individual organisms. In general, samples sizes below approximately 300 organisms will provide cause for evaluating the potential reasons that the sample does not attain the sample count goal. A low organism count may be associated with stressful environmental conditions or due to sub-optimal sampling effort. Whether or not a sample is rejected based on the organism count will depend on the known or inferred condition of the waterbody being evaluated. A sample with less than 300 organisms will be rejected if the sub-optimal count is attributable to a deficiency in sampling effort.
- The B-IBI model will be applied to sites with a reach scale channel gradient of 0.1% or greater; channel gradients will be assumed to be in the acceptable range if this information is not readily available.
- The B-IBI model will be applied to benthic community data from throughout the entire state.
- The B-IBI model scoring will be calibrated to a 0 - 100 scoring scale.
- The B-IBI WQA threshold for determining impairment varies by EPA Level 3 ecoregion (i.e. based on the distribution of reference site scores in a given ecoregion).
- Multiple bioassessment scores in a single year will be averaged together.
- Data from the most recent two years of data collection are required to determine if the biological community of an AU is degraded. In general, for listings that existed in a prior WQA, the listing category will only be changed if newer data justifies a change in category.

- B-IBI score assumptions: Scores below the 10th percentile of the reference site score distribution by EPA Level III Ecoregion will be used as the basis for identifying degraded biological integrity. The table below provides the 10th percentile for reference sites within the various ecoregions of Washington using data through 2016. Values represent estimates from 10,000 bootstrap replications.

  B-IBI threshold for indicating degraded biological integrity based on data through 2016.

Level III Ecoregion	B-IBI (0-100 scale) 10th Percentile
North Cascades	63
Cascades	72
Coast Range	62
Puget Lowland	65
Willamette Valley[1]	65
Eastern Cascades Slopes & Foothills	54
Northern Rockies	60
Blue Mountains	68
Columbia Plateau	39

  [1]The thresholds for the Puget Lowland ecoregion also apply to the small portion of the Willamette Valley Ecoregion in Washington for WQA purposes.

~~Water column measurements of chemical and physical components for rivers and streams may not provide sufficient information to detect or resolve all surface water problems. Biological evaluations may detect physical habitat-related or chemical impairments for which there are no criteria. For this reason, bioassessment methods are used to identify the biological health of the waterbody. In the past, biological data has been accepted regardless of collection methods. In 2012, Ecology will prefer data collected in accordance with Standard Operating Procedures (SOP) #EAP073, but may also accept data collected using other protocols. After 2012, all biological data submitted for review must be collected using the field and data reporting protocols outlined in the SOP for collecting freshwater macroinvertebrates. Although the state water quality standards do not currently contain numeric biocriteria limits, bioassessment tools are used to determine impairment to designated uses of water bodies. This is an application of the narrative standards in WAC 173-201A-260 and 300. Ecology currently endorses and uses the River Invertebrate Prediction and Classification System (RIVPACS) multivariate model and a multi-metric index of Biotic Integrity (IBI) to help identify impairments of the biologic community.~~

~~*Bioassessment Model Information*~~
~~Ecology uses RIVPACS and multi-metric index models like the Benthic Index of Biotic Integrity (B-IBI) to assess the biological condition of streams. RIVPACS uses established reference site information to determine a score from the presence of taxa relative to taxa expected to occur.~~

These expectations are based on a set of "predictor variables" that are not affected by human activities. This value identifies, with a specified level-of-confidence, impairment beyond that which can be attributed to natural conditions.

B-IBI is based on the scaled response of community attributes to a range of changes in environmental conditions. The score for each attribute is representative of Good, Fair or Poor conditions, and are summed to give an overall picture of the biological integrity of the stream.

Ecology encourages the collection of supplemental data during biological sampling events, especially conventional and chemical pollutant parameters that may be associated with sources present in the waterbody. This information is important in determining what may be causing an impaired biological community.

Ecology compiled the following information, including field collection protocols and taxonomic references:

Field collection and Lab Specifications for collecting freshwater macroinvertebrates: Adams, K.C. 2011 Standard Operating Procedures and Minimum Requirements for the Collection of Freshwater Benthic Macroinvertebrate Data in Wadeable Streams and Rivers. EAP073. http://www.ecy.wa.gov/programs/eap/qa/docs/ECY_EAP_SOP_073BenthicMacroinvertebrateDataCollection_v1_0.pdf

The Pacific Northwest Aquatic Monitoring Partnership (PNAMP) protocol may be used as an example for the variety of 8 ft^2 sampling strategies that can be used in Pacific Northwest rivers and streams for collecting benthic macroinvertebrates. The RIVPACS model for Western Washington can be used with any of the permutations for sampling. The PNAMP protocol document may be found at the following web page: www.monitoringmethods.org/

Taxonomic Effort: Standard Effort follows Plotnikoff and Wiseman (2001) Benthic Macroinvertebrate Biological Monitoring Protocols for Rivers and Streams. http://www.ecy.wa.gov/pubs/0103028.pdf . Any questions of nomenclature validity and classification will defer to the Integrated Taxonomic Information System (ITIS) available online at: http://www.itis.gov/ .

Data Analysis: The Utah State University's Western Center for Monitoring and Assessment of Freshwater Ecosystems provides publicly available tools for calculating RIVPACS scores at the following website: www.cnr.usu.edu/wmc

Data submittals should include the raw macroinvertebrate assemblage counts, an environmental matrix reporting data for predictor variables (including LAT/LONG, Slope at the site, Elevation, and Sample Date), and any other applicable information detailed in Section 4 of this policy.

Ecology will require a minimum of two years of monitoring data at the site to ensure that consistent results point to impairment to list as a Category 5 site. This will help minimize the risk that a single data point reflects an anomaly rather than a trend.

Category Determinations [NOTE: CATEGORY DETERMINATIONS HAVE BEEN REVERSED, FROM CATEGORY 5 TO CATEGORY 1, AND EDITED]

Category 5~~Determination~~

An AU qualifies for Category 5 when:

- The average B-IBI score from the most recent two years with data is less than the 10th percentile of reference site scores for the associated EPA Level III Ecoregion (See B-IBI threshold table).

  AND

- The average of any pollutant-related biological index score from the most recent two years with data is below the defined tolerance levels, or if not defined, below the 10th percentile of the index scores for the associated reference sites.
  - The benthic assemblage indices correlated with pollutant levels that will be used are the Hilsenhoff biotic index, a fine sediment index, and a metals tolerance index. Other benthic assemblage indices will be used once they are developed (for example, a thermal indicator index is currently under development and will be used when available). The purpose of this step is not to identify a probable pollutant, but to provide higher confidence that a pollutant impairment is occurring. Although these indices do not cover all possible pollutants that may be present, impairment by additional pollutants is likely to be captured in the scores of one or more of the above indices since the taxa that are harmed by sediment, metals, temperature and/or organic enrichment are often harmed by other pollutants.

Ecology will also consider identifying an AU as impaired when the biological data clearly indicate an ongoing downward trend in B-IBI scores relative to historic conditions.

A Category 5 listing based on bioassessment data does not have a known cause of the degraded biological integrity because a stressor identification analysis has not yet been done. Therefore, bioassessment listings in Category 5 will initially be assigned the parameter name "**Benthic Biodiversity- cause unknown".** The listing will remain in Category 5 until a stressor identification analysis is done to determine if one or more pollutants are contributing to impairment. If the analysis identifies specific pollutants as likely causes of impairment, then the Category 5 listing for "Benthic Biodiversity-cause unknown" will be modified to indicate the Category 5 listing(s) based on each identified pollutant parameter.

A Category 5 listing based on bioassessment data in a previous listing cycle can be removed from Category 5 to Category 1, 2, or 3 in a subsequent WQA cycle if the most recent data does not meet the requirements described above for listing in Category 5. After a stressor identification analysis is done, a Category 5 listing based on bioassessment data can only be moved to Category 4A (has an approved TMDL) pending the completion of a TMDL for the pollutant(s) identified, or to 4C (impairment by a non-pollutant) pending identification of non-pollutants as the likely cause of impairment. Guidance for stressor identification of biologically

impaired aquatic resources in Washington State can be found on the Ecology publications website.

~~A waterbody segment will be placed in Category 5 as biologically impaired when the RIVPACS score calculated from the two most recent years of available macroinvertebrate assemblage data results in a score less than 0.73, or a B-IBI score indicates a level of degradation such that the uses in the water body are impaired.~~

Category 4 ~~Determination~~

Category 4 is only indirectly applicable to bioassessment since Category 5 listings based on bioassessment data will transition to pollutant or habitat impairment listings after a stressor identification analysis is completed. In other words, there will be no Category 4 listings for bioassessment.

Categories 4A and 4B

A Category 5 listing for "Benthic Biodiversity-cause unknown" will be replaced with a Category 5 listing for each pollutant parameter identified in a stressor identification analysis. When a subsequent TMDL is approved or an alternative pollution control program is implemented for a pollutant identified from the stressor analysis, the listing for that pollutant will be moved from Category 5 to 4A or 4B, as appropriate.

This listing policy provides guidance on determining category listings for the WQA and is not intended to provide guidance or direction on subsequent TMDL development and implementation. Nonetheless, it is important to note that a TMDL based on pollutants identified from a stressor identification analysis due to degraded B-IBI threshold scores may need to also address other stressors that are identified as non-pollutants. Pollutant stressors are often highly correlated with stressors from habitat impairment. For example, fine sediment may be identified as the pollutant, while flow alterations are identified as the stressor on aquatic habitat. These stressors are interrelated, as flashy flows transport more sediment from the watershed into the stream and can likewise result in in-stream erosion. Thus, an integrated approach may be needed in the TMDL to address all stressors and bring the waterbody back into compliance with meeting water quality standards and protecting designated uses of the waterbody.

A TMDL based on pollutants identified as a stressor on the biologic macroinvertebrate community will likely need to evaluate the effects of potential combinations of anthropogenic pollutants, anthropogenic habitat alterations, natural habitat limitations, and/or natural water quality limitations. It is possible that a site may naturally have sub-optimal habitat that limits biological diversity and will continue to have B-IBI scores below the 10^{th} percentile of reference site scores even if the pollutant-caused impairment has been eliminated. In this case, the B-IBI approach described in this policy would be insufficient for determining if the pollutant-caused impairment had been remedied. The TMDL effectiveness monitoring will likely need to take into consideration the natural environmental potential in establishing expectations for the biological community and determining the benthic habitat condition.

Category 4C

If the stressor identification analysis for a Category 5 "Benthic Biodiversity-cause unknown" listing indicates that a non-pollutant (such as physical habitat alteration or flow) is likely to be a stressor on the biologic community, the listing will be modified to a Category 4C and the stressor identified, such as "habitat alteration".

~~A segment will be placed in Category 4a when EPA has approved a TMDL for pollutants identified as stressors to the macroinvertebrate community. A segment will be placed in Category 4b when Ecology approves the use of a pollution control program for pollutants identified as stressors to the macroinvertebrate community. Placement of a waterbody segment in Category 4c for either RIVPACS or the B-IBI will be based on impairment data and information that show the condition is likely not the result of pollutant sources but from other factors as defined in the section explaining Category 4c.~~

Category 3 ~~Determination~~

An AU will be placed in Category 3 when the available data are insufficient for another category determination (such as only one year of data is available). This information will be maintained in Ecology's WQA database for future use. As additional data and information become available in future listing cycles, Ecology will again assess all available data to make a new category determination according to this policy.

~~A waterbody segment will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's Assessment database for future use. As additional data and information become available, Ecology will again assess all available data to make a new category determination according to this policy.~~

Category 2 ~~Determination~~

An AU qualifies for Category 2 when:

- The average B-IBI score from the most recent two years are below the 10th percentile of reference site scores but no pollutant-related metrics are below the 10th percentile of reference sites.

OR

- The average B-IBI score from the most recent two years are above the 10th percentile of reference site scores but one or more pollutant-related metrics are below the 10th percentile of reference sites.

~~A waterbody segment will be placed in Category 2 based on bioassessment of the benthic macroinvertebrate community when a RIVPACS score from two of the most recent five years of available data results in a score less than 0.86 and at least 0.73, or a B-IBI score indicates a level of degradation that indicates the uses in the waterbody are not impaired but are starting to be degraded.~~

Category 1 ~~Determination~~

An AU qualifies for Category 1 when the average B-IBI score from the most recent two years are above the 10th percentile of reference site scores and no pollutant-related metrics are below the 10th percentile of reference sites.

~~A waterbody segment will be placed in Category 1 based on a bioassessment when the RIVPACS score from the two most recent years of available macroinvertebrate assemblage data are equal to or greater than 0.86, or a B-IBI score indicates no biological impairments.~~

Helpful Documents

- EAP073 - Collecting Freshwater Benthic Macroinvertebrate Data in Wadeable Streams and Rivers
- Larson, C. 2016. *Standard Operating Procedures and Minimum Requirements for the Collection of Freshwater Benthic Macroinvertebrate Data in Wadeable Streams and Rivers. SOP EAP07*
- *U.S. EPA, 2005.* Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act.

c. Contaminated Sediments [Moved to part 3 AND EDITED]

Designated Uses:	Aquatic life
Numeric Criteria:	WAC 173-204 – *Sediment Management Standards*
Narrative Standards:	WAC 173-204-100(3)
Unit of Measure:	Depending on chemical constituent: - mg/kg dry weight (ppm dry) *OR* - µg/kg dry weight (ppb dry) *OR* - mg/kg organic carbon (ppm carbon) *OR* - Biological data

Assessment Information and Specific Data Requirements

The *Sediment Management Standards* (SMS), WAC 173-204 (www.ecy.wa.gov/programs/tcp/smu/sed_standards.htm), administered by Ecology's Toxics Cleanup Program (TCP), are promulgated under the authority of Chapter 90.48 RCW, *Water Pollution Control Act*, and Chapter 70.105D RCW, *Model Toxics Control Act* (MTCA), to establish marine, low salinity, and freshwater surface sediment management standards for the state of Washington.

Data submitted on sediment contamination may be based on either chemical or biological data. The samples must be taken from surface sediments 0 – 15 centimeters in depth (the biologically active zone). Any depth interval from 0 – 15 centimeters required to be sampled by Ecology can be used to determine compliance with sediment criteria. Sediment data must be verified as being error free in EIM. For information on the sediment data submission requirements see: http://www.ecy.wa.gov/programs/tcp/data_submittal/Data_Requirements.htm

The most recent chemical and biological data will be used and can override older data on a station-by-station basis if it is in compliance with the SMS and Ecology requirements. Confirmatory biological testing, in compliance with the SMS and Ecology requirements, may override chemical data.

Data submitted for toxic pollutants must be for the specific isomer or chemical fraction addressed in the criteria. Marine biological sediment tests must conform to WAC 173-204-315.

The definitions Ecology uses for sediment analytical limits are taken from the MTCA (WAC 173-340-200).

3. *Method Detection Limit (MDL)*: Minimum concentration of a compound that can be measured and reported with 99% confidence that the value is greater than zero.

4. *Practical Quantitation Limit (PQL)*: The lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operating conditions, using department approved methods.

The SMS [WAC 173-204-320(2)(a)] requires that, when laboratory results indicate an undetected chemical, the detection limit shall be reported to be at or below the Marine Sediment Quality Standards (SQS) chemical criteria. The Chapter 7 Quality Assurance and Quality Control Requirements of the *Sediment Sampling and Analysis Plan Appendix* (Ecology Publication No. 03-09-043 www.ecy.wa.gov/biblio/0309043.html) note that the PQL shall not be greater than the SQS of the SMS.

The *Sediment Sampling and Analysis Plan Appendix* Table 5 lists the recommended PQL limits for each SMS chemical. If a chemical concentration is reported as undetected or an estimate between PQL and MDL, then the PQL should also be provided.

Category 1 Determination

A site can be placed in Category 1 if it has been determined by the TCP to meet the *Sediment Management Standards*.

Category 2 Determination

Sites showing exceedances of the SQS, as identified in the SMS (WAC 173-204-320 and 173-204-410), will be included in Category 2. This generally includes sites where:

- The mean of < 3 chemical samples exceed CSL.
- The mean of ≥ 3 chemical samples exceed SQS.
- There are biological exceedances equating to 1 - 2 biological points.

These sites have been determined to exceed the SQS and will require further investigation and monitoring to determine if the exceedances are a result of an ongoing source, historic source, or a combination of both. If the exceedances are determined to be partially or completely caused by an ongoing source, then further source control efforts, pollution control actions, or other regulatory actions will be required and specified on a case-by-case basis by the Toxics Cleanup Program. If the exceedance is determined to be caused solely by an historic source then further monitoring may be required to determine if a cleanup action is needed (WAC 173-204-400 through 590).

There are no numeric SQS in WACs for chemical effects in freshwater or low salinity sediments. However, information on chemical effects in these areas can be used to place a segment in Category 2. (See Ecology, *Creation and Analysis of Freshwater Sediment Quality Values in Washington State*, Publication No. 97-323a (1997), www.ecy.wa.gov/biblio/97323a.html and *Development of Freshwater Sediment Quality Values For Use in Washington State*, Publication No. 03-09-088 (2003), www.ecy.wa.gov/biblio/0309088.html.

Category 3 Determination

A waterbody segment will be placed in Category 3 when the available data are insufficient for any other category determination. For example, this could include sites where the mean of < 3 chemistry samples exceed the SQS. This information will be maintained in Ecology's assessment database for future use. As additional data and information become available, Ecology will again assess all available data to make a new category determination according to this policy.

~~Category 4 Determination~~

~~A waterbody segment will be placed in Category 4a when EPA has approved a TMDL for contaminated sediments. Contaminated sites identified in the Sediment Cleanup Status Report that have an active cleanup in process that is documented through a Cleanup Action Plan (CAP), Record of Decision (ROD), Corrective Measure (CM), or other approved legally enforceable cleanup plan will be placed in Category 4b. Various authorities are used to accomplish cleanup of contaminated sediment sites. Which authority is applied depends on the site, sources of contaminants, and sometimes even the liable parties. Cleanup of sediment sites is primarily conducted using either CERCLA authority under the EPA "Superfund" program or the State cleanup laws and rules discussed in the *Introduction* section of this report. Those State cleanup authorities are the *Model Toxics Control Act* cleanup regulation, Chapter 173-340 WAC, and the *Sediment Management Standards*, Chapter 173-204 WAC. Other supporting authorities are not exempted from cleanup consideration.~~

~~Category 5 Determination~~

~~Cleanup sites identified in accordance with WAC 173-204-500 through 173-204-590 which do not currently have an approved ROD, CAP, CM, or other approved, legally enforceable cleanup plan will be included in Category 5 and managed under the authority of the TCP. These sites will include those identified in the most recent Sediment Cleanup Status Report as well as identified new areas, not yet included in the report, that exceed the Cleanup Screening Level (CSL) levels. See the appendix to this document for further details on category determinations, *Category Determination for Contaminated Sediments*.~~

~~For freshwater or low salinity sediments, assessment for potential listing of segments in Category 5 will be based on biological tests in accordance with WAC 173-204-330 and 173-204-340, and will be done on a case-specific basis.~~

~~The chemical criterion for a Category 5 listing requires that the mean concentration of each SMS chemical measured at three spatially distinct and chemically similar stations must exceed the CSL within a given grid and meet the assessment criteria in WAC 173-204-510 through 520.~~

~~The biological point system is in compliance with the SMS WAC 173-204-520(3)(d). Whereas, when any two of the biological tests exceed the SQS (two "hits") at any one given station, it is a CSL biological exceedance for that station and that station is assigned 2 points. When only one biological test exceeds the SQS (one "hit") at any one given station, it is an SQS exceedance for that station and that station is assigned 1 point. Each station can have a maximum of 2 points, and there can be multiple spatially distinct and chemically similar stations per grid. A total of 3 points or greater within a given grid would be required for a Category 5 biological listing. For example, this would equate to three spatially distinct and chemically similar stations exceeding the biological SQS criteria (3 points); or two spatially distinct and chemically similar stations, one exceeding the CSL and one exceeding the SQS (3 points); or two spatially distinct and chemically similar stations each of which exceed the CSL (4 points); or any combination of SQS and CSL station designations which result in 3 points or greater.~~

~~d~~2C. Dissolved Oxygen

Designated Uses:	Aquatic life
Numeric Criteria:	WAC 173-201A-200(1)(d); WAC 173-201A-210(1)(d)
Narrative Standards:	WAC 173-201A-260 & -300
Unit of Measure:	mg/L or parts per million (ppm)

Assessment Information and Specific Data Requirements

The water quality standards for dissolved oxygen (DO) set minimum criteria limits that are designed to protect the most sensitive aquatic life uses (e.g. ~~salmon spawning and rearing). Dissolved oxygen concentrations are not permitted to fall below a criterion at an average frequency greater than once in ten years. The standards also allow a measurable decrease (0.2 mg/L) in water below natural conditions due to human actions.~~salmonid spawning and rearing). The State's water quality standards for DO are expressed as a one-day minimum; there is no averaging period in the DO criteria.

This WQA method applies to water column DO concentrations. The assessment of ~~dissolved oxygen data~~ compliance with the DO criteria are ~~based on either continuous~~evaluated using time series monitoring ~~data or~~ datasets (i.e. using probes that continuously measure DO at a set time interval) or discrete measurement (also called instantaneous, single ~~sample event (~~, or grab sample) ~~data. Continuous monitoring is preferred, as it~~datasets. For purposes of the WQA, data sets are treated as time series when measurements are recorded at least once per hour for at least 80% of each day (i.e. ≥19 hours per day). Time series data provides a better representation of the waterbody condition throughout the day in comparison to discrete sample data since ambient ~~dissolved oxygen~~DO concentrations typically exhibit a diurnal cycle. ~~Continuous monitoring~~Unlike discrete measurements, time series data can ~~better~~be used to determine the lowest daily ~~dissolved oxygen~~DO concentration in a ~~water body. However, until improved technology leads to easy and cost effective continuous dissolved oxygen measurements, Ecology recognizes that most dissolved oxygen monitoring is performed as~~waterbody. **For either type of data, the single** ~~sample events.~~

~~Data sample values collected infrequently or less frequently than one sample~~**lowest value** ~~per hour will be considered "single sample data." Data sets that include at least one sample~~**recorded on any given day is the value** ~~per hour will be considered continuous monitoring~~**used to represent that day in determining whether or not the AU meets water quality criteria.**

~~In freshwater~~DO levels are much more likely to be at their lowest point in the early morning and highest in the afternoon when greater light exposure increases photosynthesis in aquatic plants and algae. For this reason, discrete sample DO data tends not to accurately represent the lowest DO concentration that occurs during a day. DO levels can also show seasonal variation in

response to changes in water temperature and photosynthetic & respiration rates by aquatic plants and algae.

For marine waters, lakes, and reservoirs, where a detailed vertical profile of ~~dissolved oxygen~~DO data ~~are~~is collected, Ecology will average the data values within each stratified layer when stratification exists~~. Naturally occurring conditions will be considered~~ (such as thermal stratification in a lake) or averaged into increments that are consistent with accepted scientific practices. An exceedance is indicated in profile data when more than 10% of the water column are below the criterion magnitude. Naturally occurring conditions, such as natural eutrophication in pristine lakes or incoming ocean water, will be considered when determining whether the waterbody DO condition is due to human sources.

~~In marine waters, where a detailed vertical profile of dissolved oxygen data are collected, dissolved oxygen data should be averaged into increments that are consistent with accepted scientific practices. Naturally occurring conditions, such as incoming ocean water, will be considered when determining whether the water body is impaired by human sources.~~
The estimated instrument accuracy in measuring ambient DO is ±0.2mg/L. DO values that exceed a criterion magnitude by more than 0.2 mg/L are more likely to accurately indicate a criterion exceedance. Ecology will not count a DO value from a time series dataset as an exceedance when it exceeds the criterion by 0.2mg/L or less. Since discrete data is unlikely to capture the daily extreme values, an exceedance is likely to be greater than what is actually observed. Therefore, it is not necessary to account for instrument accuracy with discrete DO data and the 0.2mg/L margin of error will not be applied to such values.

Evaluating Data using the Hypergeometric Test

The hypergeometric statistical test will be used to assess whether an AU should be placed in Category 5 due to exceedances of the lowest measured DO concentration for each day from available time series and/or discrete data.

For marine waters, lakes, and reservoirs with DO profile data, vertical variability in the DO profile may be considered when determining if there has been an exceedance of a criterion. For example, if a water column meets the criterion except at depths close to the sediment interface, it may be appropriate not to attribute a criterion exceedance to the data since certain waters naturally have depleted DO near the sediment interface.

The following considerations will be made using the hypergeometric test:

- The data from each year is assessed separately to determine if each year passes or fails.
- The test is performed separately on discrete and time series datasets.
- The test is performed with the "allowable" criterion exceedance rate set at 5%. In other words, exceedances of the criteria on more than 5% of the days in a year indicates that the criteria are not persistently met and therefore the aquatic life use is impaired. The actual number of allowed exceedances varies according to the statistical probability associated with the number of exceedances observed out of the number of samples collected; when fewer samples are available, fewer exceedances are "allowed". See table under the Category 5 description.

Category Determinations [NOTE: CATEGORY DETERMINATIONS HAVE BEEN REVERSED, FROM CATEGORY 5 TO CATEGORY 1, AND EDITED]

More recent data outweighs older data in qualifying an AU for a given category. For example, if the AU qualifies for Category 5 based on earlier years but are followed by subsequent years that qualify for Category 1, then the AU will be placed in Category 1. The exception is that years with insufficient data to evaluate compliance do not outweigh prior years that qualify for another category. Once a listing is placed in Category 5, 4A, or 4B, it can only move out of the category by qualifying for Category 1.

Category 5 ~~Determinations~~

There are two general pathways by which an AU can be placed in Category 5. The first pathway involves applying the hypergeometric test to time series and discrete data. The second pathway involves evaluating if there are any observations of large deviations from the criterion magnitude. Important exceptions to these two general pathways are also described below. Category 5 listing determinations for the two pathways are:

1. An AU will be placed in Category 5 when the hypergeometric test is failed in one or more calendar years based on time series data or two or more calendar years based on discrete data (see table below). Exceedances in at least one year of time series data can lead to a Category 5 listing with a higher confidence level that there is a pattern of persistent exceedance that could impair aquatic life, while two years are necessary when using discrete data in order to establish that DO exceedances are indicative of a pattern of altered DO instead of transient occurrences that are unlikely to impair the aquatic life use.

The table below shows, for a given sample size, how many observed days having exceedances of the criteria magnitude result in failure of the hypergeometric test.

Total Number of Days with Measurements	Number of Exceedances that Fail the Hypergeometric Test	Total Number of Days with Measurements	Number of Exceedances that Fail the Hypergeometric Test
1	N/A*	135 - 154	≥11
2 - 8	≥ 2	155 - 173	≥12
9 - 19	≥ 3	174 - 194	≥13
20 - 32	≥ 4	195 - 214	≥14
33 - 47	≥ 5	215 - 236	≥15
48 - 63	≥ 6	237 - 258	≥16
64 - 80	≥ 7	259 - 283	≥17
81 - 98	≥ 8	283 - 310	≥18
99 - 116	≥ 9	311- 365	≥19
117 - 134	≥ 10		

*A statistically significant p-value is obtained when only a single measurement is available and the value exceeds the criterion; however, a minimum of two exceedances is required in order to help ensure confidence in Category 5 determinations.

OR

2. An AU will be placed in Category 5 when the above requirements are not met, but a large deviation from the criterion magnitude is observed, which would provide high confidence that the DO criteria are not persistently met:

   - For fresh water, when any single day has a verifiable DO value below 6.5 mg/L in a given year (i.e. using the *Salmonid Spawning, Rearing, and Migration only DO criterion*, which is the least stringent criterion for fresh water).
   - For marine water, when any single day has a verifiable DO value below 4.0 mg/L (i.e. using the *Fair Quality* marine DO criterion, which is the least stringent criterion for marine water).

Exceptions to the two pathways:

- Some waterbodies have site specific DO criteria listed in Table 602 (WAC 173-201A-602). For these waterbodies, compliance will be assessed using the hypergeometric test as described previously along with the criterion magnitude and any time period specified in Table 602. For example, the special criterion for the lower Columbia River requires DO levels to be above 90% saturation at all times. The hypergeometric test for the lower Columbia River will be based on the number of days in which DO falls below 90% saturation in a given year and the total number of days measured in that year.
- The solubility of DO in a waterbody is influenced by barometric pressure, water temperature, and specific conductivity. Some waters at higher elevations that meet temperature criteria will not attain the DO criteria even at 100% DO saturation. Ecology will not place the DO listing in Category 5 where this circumstance is identified.

~~Category 5 determinations are dependent on whether the sampling consisted of single grab or continuous monitoring. Dissolved oxygen excursions at flow rates greater than the 7Q10 low-flow rate within the latest ten years may be used to place a segment in Category 5 unless other information indicates that the excursions are natural or a significant amount of data exists for the segment during the critical summer period that is in compliance with the criteria. Flow rate and 7Q10 low-flow rate need not be reported, but if available the flow rate at time of sampling and the calculated 7Q10 low-flow rate will factor into the Category 5 determination.~~

~~A waterbody segment will be placed in Category 5 using single sample data when (1) a minimum of three excursions exist from all data considered, and (2) at least ten percent of single grab sample values in a given year do not meet the criterion. A waterbody segment may also be placed in Category 5 for dissolved oxygen when three daily minimum values from continuous monitoring are below the criterion.~~

Category 4 ~~Determinations~~

An AU will be placed in Category 4A when EPA has approved a TMDL for DO.

An AU will be placed in Category 4B when EPA approves use of a pollution control program for DO.

~~A waterbody segment will be placed in Category 4a when EPA has approved a TMDL for dissolved oxygen. A segment will be placed in Category 4b when EPA approves use of a pollution control program for dissolved oxygen. Category 4c does not apply to pollutants.~~

Category 3 ~~**Determinations**~~

An AU will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's assessment database for future use. As additional data and information become available in future listing cycles, Ecology will again assess all available data to make a new category determination according to this policy.

~~A waterbody segment will be place in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's assessment database for future use. As additional data and information become available, Ecology will again assess all available data to make a new category determination according to this policy.~~

Category 2 ~~**Determinations**~~

An AU will be placed in Category 2 when exceedances of the criteria have been observed, but the listing does not qualify for Category 5.

~~A segment will be placed in Category 2 when there are fewer excursions beyond the criteria than are necessary to place in Category 5 but at least one excursion of the water quality standard is determined. A minimum number of samples is not required for a Category 2 determination.~~

Category 1 ~~**Determinations**~~

An AU will be placed in Category 1 when the available data show no exceedances of the DO criteria during the summer season (June 15 - September 15th) in two or more years. To move from Category 4A or 4B to Category 1, there must be no days with exceedances of the TMDL targets during the Ecology designated critical period(s) in two or more years.

- If a season other than the summer is expected to have the lowest DO levels during the year, then that season should be used to show compliance instead of the summer season. The requirements listed below would also apply to the alternative season.
- Both years used to qualify for Category 1 must have a minimum of 21 days with measurements collected within the focal period of 12am and 9am during the summer season or designated critical period. The days do not need to be consecutive. Discrete or time series datasets may be used. If data is available outside of the summer season/critical period or outside of the daily focal period, then the entire datasets for each of the two years must have no exceedances.
- The years used to qualify for Category 1 do not need to be the two most recent nor do they need to be adjacent years as long as there are no intermediate or subsequent years that qualify for Category 2 or 5.

~~Dissolved oxygen varies on annual and often daily cycles, and impairment occurs when the water does not contain enough dissolved oxygen to protect aquatic uses. The lowest dissolved oxygen levels of the year generally occur in the early morning during a critical season which is typically the summer and early fall (June through September).~~

~~Continuous monitoring datasets with values collected at least once an hour to capture possible seasonal and diurnal excursions of the criteria will be used to place a waterbody segment in Category 1. Data collection schedules must occur throughout the seasonal duration in which dissolved oxygen concentrations are expected to be lowest. A waterbody segment will be placed in Category 1 when data from the most recent two years in which the data exists show no excursions below the criteria.~~

~~Single sample events (grab samples) will not be used to determine a Category 1 listing because this sampling method is insufficient to show that the water body meets the dissolved oxygen criteria during the critical periods.~~

Helpful Documents

- EAP023 (Publication #17-03-202) - Collection and Analysis of Dissolved Oxygen (Winkler Method)
- EAP027 - Seawater Dissolved Oxygen Analysis
- EAP036 (Publication #17-03-203) -Benthic Flux Chambers
- EAP034 (Publication #17-03-207)- Collection, Processing, and Analysis of Stream Samples

2De. pH

Designated Uses:	Aquatic life
Numeric Criteria:	WAC 173-201A-200(1)(g); WAC 173-201A-210(1)(f)
Narrative Standards:	WAC 173-201A-260 & -300
Unit of Measure:	pH units

Assessment Information and ~~Specific~~ Data Requirements

The pH criteria are expressed as a range of acceptable ~~range of pH~~ values ~~and the allowable human-caused variation varies with~~which vary according to the designated use classification of a waterbody.

~~If more than one sample value~~ The criteria also specify an allowable limit of human-caused variation within the acceptable range of values, although data to evaluate this criteria component is ~~available~~typically unavailable for ~~the same location and day, the extreme sample value (largest excursion from the criteria) for that day will be used in the assessment. Naturally occurring conditions will also be considered~~ambient waters.

The assessment of pH data ~~are~~is based on either time series (also called "continuous") monitoring data or discrete (also called "single", "grab", or "instantaneous") sample event ~~(grab sample) data. Continuous~~data. As a general rule, lab derived pH measurements will be omitted from the WQA. Time series monitoring ~~is preferred,~~data are preferable as it ~~provides a better representation of the~~ shows how the pH of a waterbody ~~condition~~changes throughout the day ~~since pH typically exhibits a diurnal cycle. However, until improved technology leads to more projects incorporating continuous pH measurements, Ecology recognizes that most pH monitoring is performed as single sample events.~~. Discrete measurements typically miss the lowest and highest pH values of the day, which tend to occur in the early morning and late afternoon, respectively.

~~Data sample values collected infrequently or less frequently than one sample value per hour will be considered "single sample data." Data sets that include at least one sample value per hour will be considered.~~

Evaluating Data using the Hypergeometric Test

The hypergeometric statistical test will be used to assess whether an AU should be placed in Category 5 due to exceedances of the daily extreme value of the pH criteria (higher or lower than criteria limits) from available time series and/or discrete data.

- The data from each year is assessed separately to determine if each year passes or fails.
- The test is performed separately on discrete and time series datasets.
    - The estimated instrument accuracy in measuring ambient pH is ±0.2 pH standard units. pH values that depart from the criteria range by more than 0.2 units are more likely to

accurately indicate an exceedance from the criteria. Ecology will not include a pH value from a time series dataset in the count of exceedances when it exceeds the applicable criteria range by 0.2 units or less. Since discrete data values are unlikely to capture the daily extreme values, an exceedance is likely to be greater than what is actually observed. Therefore, it is not necessary to account for instrument accuracy with discrete pH data and the 0.2 unit margin of error will not be applied to such values.

- The test is performed with the "allowable" criterion exceedance rate is set at 5%. In other words, exceedance of the criteria on more than 5% of the days in a year indicates that the pH criteria are not persistently met and therefore the aquatic life use is impaired. The actual number of allowed exceedances varies according to the statistical probability associated with the number of exceedances observed out of the number of samples collected; when fewer samples are available, fewer exceedances are allowed. See table under the Category 5 description.

Category Determinations [NOTE: CATEGORY DETERMINATIONS HAVE BEEN REVERSED, FROM CATEGORY 5 TO CATEGORY 1, AND EDITED]

More recent data outweighs older data in qualifying an AU for a given category. For example, if an AU qualifies for Category 5 based on earlier years but later years qualify for Category 1, then the AU will be placed in Category 1. The exception is that years with insufficient data to evaluate compliance do not outweigh prior years that qualify for another category. Once a listing is placed in Category 5, 4A, or 4B, it can only move out of the category by qualifying for Category 1.

Category 5 ~~Determination~~

There are two general pathways by which an AU can be placed in Category 5 for pH. The first pathway involves applying the hypergeometric test to time series and discrete data. The second pathway involves evaluating if there are any observations of large deviations from the criterion magnitude. Important exceptions to these two general pathways are also described below. Category 5 listing determinations for the two pathways are:

1. An AU will be placed in Category 5 when the hypergeometric test is failed in one or more calendar years based on time series data or two or more calendar years based on discrete data (see table below). Exceedances in at least one year of time series data can lead to a Category 5 listing with a higher confidence level that there is a pattern of persistent exceedance that could impair aquatic life, while two years are necessary when using discrete data in order to establish that DO exceedances are indicative of a pattern of altered DO instead of transient occurrences that are unlikely to impair the aquatic life use.

The table below shows, for a given sample size, how many observed days having exceedances of the criteria magnitude result in failure of the hypergeometric test.

Total Number of Days with Measurements	Number of Observed Exceedances that Fail the Hypergeometric Test	Total Number of Days with Measurements	Number of Observed Exceedances that Fail the Hypergeometric Test
1	N/A*	135 - 154	≥11

2 - 8	≥ 2	155 - 173	≥12
9 - 19	≥ 3	174 - 194	≥13
20 - 32	≥ 4	195 - 214	≥14
33 - 47	≥ 5	215 - 236	≥15
48 - 63	≥ 6	237 - 258	≥16
64 - 80	≥ 7	259 - 283	≥17
81 - 98	≥ 8	283 - 310	≥18
99 - 116	≥ 9	311- 365	≥19
117 - 134	≥ 10		

*A statistically significant p-value is obtained when only a single measurement is available and the value exceeds the criterion; however, a minimum of two exceedances is required in order to help ensure confidence in Category 5 determinations.

OR

2. An AU will be placed in Category 5 when the above requirements are not met, but a large deviation from the criterion magnitude is observed, which would provide high confidence that the pH criteria are not persistently met. An AU will be placed in Category 5 when any single day has a verifiable pH value below 5.5 in freshwater, below 6.5 in marine waters, or above 9.0 in fresh or marine waters.

~~A waterbody segment will be placed in Category 5 when a minimum of three excursions exist from all data considered, and at least ten percent of values in a given year do not meet the criterion.~~

Category 4 ~~Determination~~

An AU will be placed in Category 4A when EPA has approved a TMDL that addresses pH.

An AU will be placed in Category 4B when EPA approves use of a pollution control program that addresses pH.

~~A waterbody segment will be placed in Category 4a when EPA has approved a TMDL for pH. A segment will be placed in Category 4b when EPA approves use of a pollution control program for pH. Category 4c does not apply to pollutant parameters.~~

Category 3 ~~Determination~~

An AU will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's WQA database for future use. As additional data and information become available in future listing cycles, Ecology will again assess all available data to make a new category determination according to this policy.

~~A waterbody segment will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's assessment database for future use. As additional data and information become available, Ecology will again assess all available data to make a new category determination according to this policy.~~

Category 2 ~~Determination~~

An AU will be placed in Category 2 when exceedances of the criteria have been observed, but the listing does not qualify for Category 1 or Category 5.

~~A waterbody segment will be placed in Category 2 if the threshold for placement in Category 5 is not achieved but there are sample values demonstrating excursions of the criteria. A minimum number of samples is not required for a Category 2 determination.~~

Category 1 ~~Determination~~

An AU will be placed in Category 1 when:

- The available data show that pH criteria are exceeded on 5% or less of monitored days in two or more years AND no pH value exceeds the criteria by more than 1.0 pH unit.
    - To move from Category 4A or 4B to Category 1, the criteria must be met on 95% or more of the monitored days during the Ecology designated critical period(s) in two or more years. If data are available outside of the critical period, then the exceedance rate in each of the two annual data sets must also be 5% or less.
- Both years used to qualify for Category 1 must have a minimum of 3 weeks (21 days) with measurements. The days do not need to be consecutive. Discrete or time series datasets may be used.
    - The measurements should occur during the season(s) and time of day in which exceedances are more likely to be observed, which may vary by waterbody.
- The years used to qualify for Category 1 do not need to be the two most recent nor do they need to be adjacent years as long as there are no intermediate or subsequent years that qualify for Category 2 or 5.

~~Continuous monitoring datasets with values collected at least once an hour (to capture possible seasonal and diurnal excursions of the criteria) will be used to place a waterbody segment in Category 1 for pH. Data collection schedules must occur throughout the seasonal duration in which pH concentrations are expected to exceed criteria. The waterbody segment will be placed in Category 1 if fewer than 5% of the daily values show an excursion using data from the most recent two years from which adequate data exist. The "daily value" refers to the extreme sample value for each day (described above in first paragraph of "Assessment Information and Specific Data Requirements").~~

Helpful Documents

- EAP031 - Collection and Analysis of pH Samples
- EAP034 (Publication #17-03-207) - Collection, Processing, and Analysis of Stream Samples

2E~~f~~. ~~Total~~ Phosphorus (Total) in Lakes

Designated Uses:	Recreational; Aquatic life
Numeric Criteria:	WAC 173-201A-230
Narrative Standards:	WAC 173-201A-260 & -300
Unit of Measure:	mg/L in congruence with the Ecology EIM system. (Units for total phosphorus criteria are calculated in µg/L)

Assessment Information and ~~Specific~~ Data Requirements
If available, the phosphorus criterion established by a lake-specific study as described in WAC 201A-230 will be used. If a phosphorus criterion has not been established by a lake-specific study, Ecology will apply the action values designated by ecoregion in WAC 173-201A-230 Table (1), to determine impairment. In the absence of available numeric criteria based on a lake-specific study or ecoregion action value, narrative standards will be assessed as described in ~~section 6~~Part 1E of this policy. If a phosphorus assessment for ~~a waterbody segment~~an AU includes both numeric and narrative information, the ~~Assessment~~WQA will be based on the narrative standards unless more recent numeric total phosphorus data indicate that the quality of the waterbody has changed.

The collection of phosphorus data must not be grouped nor spread out over time so as to mask periods of noncompliance. For example, if there is evidence of problems with phosphorus concentrations during a season or "critical condition" period, data collection must not be limited to or primarily conducted during other times. The ~~Assessment~~WQA period for total phosphorus in lakes is June 1 through September 30 as noted in WAC 173-201A-230. Ecology may define a different assessment period for certain lakes where available lake-specific data show the "critical condition" period to be other than June 1 through September 30.

The ~~assessment~~WQA is based on the calculated arithmetic mean of four or more total phosphorus samples collected from the epilimnion during the "critical condition" period or season. When temperature profile data are available, the depth of the epilimnion will be determined by the depth of the seasonal thermocline. When temperature profile data are not available, the epilimnion will be defined as the upper three meters of the water column. If more than one epilimnion sample value is available for the same ~~waterbody segment~~AU and day, only the maximum sample value will be used in the mean phosphorus concentration calculation.

Category Determinations [NOTE: CATEGORY DETERMINATIONS HAVE BEEN REVERSED, FROM CATEGORY 5 TO CATEGORY 1, AND EDITED]

Category 5 ~~Determination~~
A lake or lake grid ~~segment~~AU will be placed in Category 5 when the calculated mean phosphorus concentration of a single season or "critical condition" period exceeds the criterion or action value for that lake or lake grid ~~segment~~AU. A Category 5 determination may also result from narrative standards as described in ~~section 6~~Part 1E of this policy.

Category 4 ~~Determination~~
A lake or lake grid ~~segment~~AU will be placed in Category ~~4a~~4A when EPA has approved a TMDL for total phosphorus.

A lake or lake grid ~~segment~~AU will be placed in Category ~~4b~~4B when EPA approves use of a pollution control ~~project~~program for total phosphorus. ~~Category 4c does not apply to pollutant parameters.~~

Category 3 ~~Determination~~
A lake or lake grid ~~segment~~AU will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's ~~Assessment~~WQA database for future use. As additional data and information become available in future listing cycles, Ecology will again assess all available data to make a new category determination according to this policy.

Category 2 ~~Determination~~
A lake or lake grid segment will be placed in Category 2 when fewer than four sample values are available from a single season or "critical condition" period, and at least one value is greater than the criterion or action value for that waterbody.

Category 1 ~~Determination~~
A lake or lake grid ~~segment~~AU will be placed in Category 1 under the following conditions:

- Four or more sample values are available in each of two or more consecutive years; and
- The arithmetic mean of the sample values for each "critical condition" period or season from each year is equal to or less than the numeric criterion or action value for that waterbody.

Helpful Documents

- EAP034 (Publication #17-03-207)- Collection, Processing, and Analysis of Stream Samples

2Fg. Temperature

Designated Uses:	Aquatic life
Numeric Criteria:	WAC 173-201A-200(1)(c); Including spawning and incubation protection in Ecology publication 06-10-038 WAC 173-201A-210(1)(c)
Narrative Standards:	WAC 173-201A-260 & -300
Unit of Measure:	Degrees Celsius (C) or ~~Degrees~~ Fahrenheit (F) 1-day maximum (1-DMax) Continuous: 7-Day Average of the Daily Maximum (7DADMax) ~~or a 1-day maximum (1-DMax)~~

Assessment Information and Specific Data Requirements

The water quality standards set numeric criteria for maximum ~~temperature criteria for waterbodies~~ water temperatures that are designed to protect the most sensitive aquatic life uses (~~salmon spawning and rearing). The standards~~ typically cold water species).

The State's water temperature criteria are expressed in durations as either a seven-day average daily maximum (7-DADMax) or a one-day maximum (1-DMax). The assessment of compliance with the 7-DADMax criteria are evaluated using time series (also ~~allow a measurable increase (0.3 degrees C) in water~~ called continuous) monitoring datasets or discrete measurement (also called instantaneous, single, or grab sample) datasets.

Definitions of duration:

7-DADMax is the arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's maximum temperature ~~due to human actions~~with the maximum temperatures for each of the three days prior and the three days after that date.

~~To make a listing determination for~~ **1-DMax** is the highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

Accounting for error

The estimated instrument accuracy for measuring ambient temperature is ±0.2ºC. Temperature values that exceed a criterion magnitude by more than 0.2ºC are more likely to accurately indicate a true criterion exceedance. When using time series data to evaluate compliance with 7-DADMax and 1-DMax criteria, Ecology will ~~first assess numeric water temperature monitoring data to determine if there are~~ include a value in the count of exceedances~~.~~ when it exceeds the applicable criterion by more than 0.2ºC. Since discrete data is unlikely to capture the daily maximum temperature, an exceedance is likely to be greater than what is actually observed. Therefore, it is not necessary to account for instrument accuracy with discrete temperature data and the 0.2ºC margin of error will not be applied to such values.

Evaluation of discrete or time series data where a 7-DADMax or 1-DMax criterion applies

The warmest temperatures of the year and the ~~potential for~~ highest probabilities of criteria exceedances ~~(values greater than the criteria) generally~~typically occur ~~during a "critical condition" season which is the summer~~ between late spring and early fall~~(~~. The evaluation of temperature will focus on temperature measurements collected between June ~~through~~15 and September~~).~~ 15th, which corresponds to the definition of the summer season in WAC 173-201A-600 for all aquatic life uses in Table 200(1)(c) of the water quality standards.

- ~~When continuous~~Exceedances from outside of the summer season and outside of the daily focal period may be used to support a Category 5 determination when data from the summer is lacking. Values outside of the summer season that meet criteria will not be used to determine exceedances of the criteria, except for supplemental spawning criteria as described below.
- Seasonal supplemental spawning and incubation criteria in WAC 173-201A-200(1)(c)(iv) apply in some waterbodies. The seasonal numeric temperature criteria for each of these waterbodies can be found in Ecology publication 06-10-038 and will be used to evaluate exceedances.

Evaluating time series data where a 7-DADMax or 1-DMax criterion applies

- Ecology will assess the 7-DADMax temperature when time series monitoring data (sampling intervals of 30 minutes or less) are available~~, Ecology will assess the seven-day average of daily maximum (7-DADMax) temperature measurements.~~.
- One temperature value per day (the highest recorded temperature) will be used to determine a 1-DMax or to calculate a 7-DADMax.
- Time series data will be directly compared to the applicable criteria.
- The data from each year is assessed separately from other years.

Evaluating Discrete Data Using the Hypergeometric Test

The hypergeometric statistical test will be used to assess whether an AU should be placed in Category 5 due to exceedances of the highest measured temperature criteria for each day from discrete data. Discrete measurements of temperature consistently underestimate daily maximum temperatures because they are unlikely to capture the highest temperatures of the day. There is a high probability that when a discrete temperature observation exceeds a criterion magnitude, the 7DADMax also exceeds the criterion magnitude. Although discrete data typically cannot be used to calculate a 7-DADMax, they can be compared to the criterion which is expressed as a 7-DADMax. However, because discrete temperature values underestimate daily maximums, they cannot be used to place a waterbody in Category 1 by showing that criteria are being attained.

The following considerations will be made using the hypergeometric test:

- The data from each year is assessed separately to determine if each year passes or fails.
- One temperature value per day (the highest recorded temperature) will be used in the evaluation.
- The test is performed with the "allowable" criterion exceedance rate set at 5% for the summer season (June 15 – September 15). In other words, exceedances of the criteria on more than 5% of the days in the summer season indicates that the criteria are not persistently met and therefore the

aquatic life use is impaired. The actual number of allowed exceedances varies according to the statistical probability associated with the number of exceedances observed out of the number of measurements taken. See table below under the Category 5 description. For AUs with supplemental spawning period criteria, the hypergeometric test will be adjusted to the number of days associated with the length of a supplemental spawning period that applies to a given AU.

Category Determinations [NOTE: CATEGORY DETERMINATIONS HAVE BEEN REVERSED, FROM CATEGORY 5 TO CATEGORY 1, AND EDITED]

The most recent data will be used to qualify an AU for a given category. The exception is that years with insufficient data to evaluate compliance do not outweigh prior years that qualify for another category. For example, if an AU qualifies for Category 5 based on earlier years in the assessment window but are followed by later years qualifying for Category 1, then the AU will be placed in Category 1.

Category 5 ~~Determinations~~

There are three general pathways by which an AU can be placed in Category 5. The first pathway involves direct comparison of applicable 7-DADMax or 1-DMax criteria to time series data. The second pathway involves applying the hypergeometric test to discrete data. The third pathway involves evaluating if there are any observations of large deviations from the criterion magnitude.

Category 5 listing determinations for the three pathways are:

1. **Time series data**: An AU will be placed in Category 5 when there are two or more exceedances of an applicable 7-DADMax or 1-DMax criterion based on time series data in a single year.
    - The two 7-DADMax exceedances must be derived from non-overlapping seven day periods in order to avoid Category 5 determinations based solely on daily maximum values that have been double-counted.

OR

2. **Discrete data**: An AU will be placed in Category 5 when the hypergeometric test is failed in two or more years based on evaluation of discrete data to determine if more than 5% of the days during the warm season exceed the applicable criterion magnitude. The years do not have to be adjacent.

The table below shows, for a given sample size, how many observed days in a single summer season have exceedances of the criteria magnitude that result in failure of the hypergeometric test. For the sake of brevity additional tables that would be used for evaluating supplemental spawning periods (which range from a length of 108 to 350 days) are not presented here but can be obtained by Ecology upon request.

Discrete Data: Total Number of Days with Measurements	Discrete data: Number of Observed Exceedances Resulting in Hypergeometric Test Failure
1	N/A
2 - 7	≥2
8 - 18	≥3
19 - 33	≥4
34 - 51	≥5
52 - 93	≥6

OR

3. An AU will be placed in Category 5 when the above requirements are not met, but observations of daily temperatures that exceed the criterion for protecting against acute lethality of fish are observed, which would provide high confidence of aquatic life use impairment. For freshwater or marine waters, any single day has a verifiable value exceeding 23ºC[1,2], or any single day has a value exceeding 17.5ºC[3] where freshwater supplemental spawning uses apply (per *Ecology publication 06-10-038).*

[1] *1-DMax protecting salmonids against acute lethality WAC 173-201A-200 (1)(c)(vii)(A)*
[2] *1-DMax protecting salmonids against acute lethality (WAC 173-201A-210 (1)(c)(v)(A)).*
[3] *1-DMax protecting fish embryo survival WAC 173-201A-200 (1)(c)(vii))(B)*

~~Category 5 determinations are dependent on whether the sampling is single grab or multiple consecutive daily or continuous sampling. Temperature exceedances at flow rates greater than the 7Q10 low-flow rate within the latest ten years may be used to place a segment in Category 5 unless other information indicates that the exceedances are primarily natural or a significant amount of data exists for the waterbody segment during the "critical condition" summer period that show compliance with the criteria. Flow rate and 7Q10 low-flow rate need not be reported, but if available the flow rate at time of sampling and the calculated 7Q10 low-flow rate will factor into the Category 5 determination.~~

~~A waterbody segment will be placed in Category 5 using single sample data when: (1) a minimum of three excursions exist from all data considered, and (2) at least ten percent of single grab sample values in a given year exceed the criterion.~~

~~A segment will be placed in Category 5 for temperature if at least one 7-day average daily maximum value (7-DADMax) from seven consecutive daily sampling events exceeds the criterion.~~

~~Ecology lists waterbody segments on the Category 5 list due to temperature impairment when the numeric criteria are exceeded. In most cases, insufficient information exists to determine the level of human influence on temperature for each listed site. This approach assumes that human influences have contributed to the exceedance over the numeric criteria and the increase is measurable over natural conditions. While this approach may list waterbody segments as~~

~~impaired for temperature without fully knowing the extent of the human influences, listings are based on existing and readily available information. In the absence of information, the waterbody segment will remain in Category 5 until further information or data are provided to change the category determination.~~

~~After the data are assessed to determine waterbody segments that are exceeding temperature criteria, Ecology will take an additional step to determine if the water is impaired due to human influences. Any information provided through the public call for data that provide validation that human influences or natural conditions are contributing to the exceedances will be evaluated. In addition, Ecology will review land-use maps and work with appropriate regional field staff to make an initial determination that human actions could be influencing the temperature exceedances. If the determination is made that potential human influences exist that could impact temperature, the waterbody segment will be placed in Category 5. TMDLs or other pollution control studies will determine the extent of human influences.~~

Category 4 ~~Determination~~

An AU will be placed in Category 4A when EPA has approved a TMDL for temperature.

An AU will be placed in Category 4B when EPA approves use of a pollution control program for temperature.

~~A segment will be placed in Category 4a when EPA has approved a TMDL for temperature. A segment will be placed in Category 4b when EPA approves use of a pollution control program for temperature. Category 4c does not apply to pollutant parameters.~~

Category 3 ~~Determination~~

An AU will be placed in Category 3 when the available data are insufficient for any other category determination. This will typically occur when there are no exceedances in the available dataset, but the amount of data is insufficient for meeting Category 1 requirements. Typically this occurs when data show not exceedances of the criteria but are collected outside of the warm season or outside of the daily focal period.

~~A waterbody segment will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's Assessment database for future use. As additional data and information become available, Ecology will again assess all available data to make a new category determination according to this policy.~~

Category 2 ~~Determination~~

An AU will be placed in Category 2 when the monitoring data do not meet the requirements for a Category 5 or Category 1 determination but show at least one exceedance of the numeric criteria. A minimum number of samples is not required for a Category 2 determination.

~~A waterbody segment will be placed in Category 2 when the monitoring data do not meet the requirements for a Category 5 determination but show at least one exceedance of the numeric criteria. A minimum number of samples is not required for a Category 2 determination.~~

Category 1 ~~Determination~~

Continuous monitoring data is required to place an AU in Category 1.

Where 7-DADMax criterion is applicable

An AU will be placed in Category 1 when:

- 7-DADMax values are available for every day during the period of July 15 through August 15 in both years used to show compliance with the criteria.
- No 7-DADMax values exceed the applicable criterion in two or more years. The years satisfying this requirement do not need to be the two most recent nor do they need to be adjacent years as long as there are no intermediate or subsequent years that qualify for Category 2 or 5.
- For supplemental spawning periods, no 7-DADMax values exceed the applicable criterion in two or more years. If compliance with supplemental spawning criteria must be evaluated due to previously documented exceedances of those criteria, then both summer and supplemental spawning periods in the two years must be evaluated. For the supplemental spawning period it is sufficient to have 7-DADMax values for only the first and last 14 days of the period, except that periods beginning or ending in winter months need only be monitored for the two weeks that shoulder the summer season.

Where a 1-DMax criterion is applicable

An AU will be placed in Category 1 under the following conditions:

- No 1-DMax values exceed the applicable criterion in two or more years. The two years satisfying this requirement do not need to be the two most recent nor do they need to be adjacent years as long as there are no intermediate or subsequent years that qualify for Category 2 or 5.
- 1-DMax values are available for every day during the period of July 15 through August 15 in the years used to show compliance with the criteria.

~~Continuous monitoring for temperature during the critical season is required to place a waterbody segment in Category 1. Sequential data from at least two years must demonstrate consistent compliance with the numeric criteria or established natural conditions. Single sample event (grab sample) data are not used to place a waterbody segment in Category 1.~~

2G~~h~~. Total Dissolved Gas

Designated Uses:	Aquatic life
Numeric Criteria:	WAC 173-201A-200(1)(f)
Narrative Standards:	WAC 173-201A-260 & -300
Unit of Measure:	Percent (%) Saturation

Assessment Information and ~~Specific~~ Data Requirements
The assessment of total dissolved gas data are based on either continuous monitoring data or single sample event data. Continuous monitoring is preferred, as it provides a better representation of the waterbody condition. Single sample data and continuous monitoring data are assessed differently to determine impairment.

Data sample values collected less frequently than at least one sample value per hour for at least seven days will be considered single sample data. Total dissolved gas datasets that include at least one sample value per hour are considered to be continuous monitoring. Where a detailed vertical profile of total dissolved gas data are collected, Ecology will use the data value from the deepest location. Natural conditions will be considered in cases where stream structure contributes to high total dissolved gas levels such as below natural waterfalls.

Exceedances of the criteria generally occur during the highest flow rates of the year during the critical season, which is the spring and early summer (March through July). Criteria exceedances may also occur below dams during critical operational conditions, such as powerhouse shut down or start up. The criteria do not apply when flow rates exceed the 7Q10 high flow rates.

The criterion limit is 110% saturation statewide, except in the Snake and Columbia rivers during special fish passage exemptions.

Category Determinations [NOTE: CATEGORY DETERMINATIONS HAVE BEEN REVERSED, FROM CATEGORY 5 TO CATEGORY 1, AND EDITED]

Category 5 ~~Determination~~
For single sample data, ~~a waterbody segment~~an AU will be placed in Category 5 for TDG when ten percent or more sample values during the critical season or "critical condition" in the latest five years exceed the applicable criterion. A minimum of three exceedances are required for an impairment determination.

For continuous monitoring data, the percent saturation criteria are applied as an average based on the 12 highest consecutive hourly readings in a 24-hour period. ~~A waterbody segment~~An AU will be placed in Category 5 for TDG when two or more 12-hour average values in the same year are above the criterion. The 12 highest consecutive hourly readings are not to be overlapping.

Category 4 ~~Determination~~

~~A waterbody segment~~An AU will be placed in Category ~~4a~~4A when EPA has approved a TMDL for total dissolved gas. ~~A segment~~

An AU will be placed in Category ~~4b~~4B when EPA approves use of a pollution control program for total dissolved gas. ~~Category 4c does not apply to pollutant parameters.~~

Category 3 ~~Determination~~

~~A waterbody segment~~An AU will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's ~~assessment~~WQA database for future use. As additional data and information become available in future listing cycles, Ecology will again assess all available data to make a new category determination according to this policy.

Category 2 ~~Determination~~

~~A waterbody segment~~An AU will be placed in Category 2 if the threshold for placement in Category 5 or 1 is not achieved but there are events demonstrating exceedances in the latest ten years. Placement into Category 2 may also occur if evidence shows that natural conditions are the cause of exceedances but data are insufficient to make a conclusive determination.

Category 1 ~~Determination~~

Continuous monitoring datasets with 12-hour average values of data collected at least once an hour, so as to capture possible seasonal and hourly ~~excursions~~exceedances of the criteria, will be used to place ~~a waterbody segment~~an AU in Category 1. A minimum of three years of continuous monitoring during the peak runoff season, in years with peak flows reaching 7Q10 levels, is necessary for a Category 1 determination. Below a hydropower facility, seven days of continuous monitoring below the powerhouse while it shuts down and restarts (~~at least~~ once each day) are necessary for a Category 1 determination. If no 12-hour average exceeds the criterion, the ~~waterbody segment~~AU may be placed in Category 1.

~~Single sample data will not be used to determine a Category 1 listing in waterbody segments where TDG concentrations are affected by hydromodifications.~~

2H. Toxics-Aquatic Life Criteria

Designated Uses:	Aquatic life Recreational
Numeric Criteria:	WAC 173-201A-240
Narrative Standards:	WAC 173-201A-240(1); -260; -300
Unit of Measure:	*Water column data*: All substances must be reported in µg/L except for ammonia and chloride which must be reported in mg/L.

Assessment Information and Data Requirements

The aquatic life criteria are designed to protect freshwater and marine organisms from short-term (acute) and long-term (chronic) exposure to toxic substances. To meet this intent, one or more of the following durations for pollutant concentrations are built into the chemical criteria:

- An instantaneous concentration not to be exceeded at any time (acute).
- A 24-hour average not to be exceeded (chronic[2]).
- A 1-hour average concentration not be exceeded more than once every three years (acute).
- A 4-day average concentration not to be exceeded more than once every three years (chronic).

Averaging periods

There are two ways that data will be used to assess the toxic substances criteria:

1. An instantaneous discrete sample will be assumed to represent the averaging periods for the acute criteria and the 24-hour chronic criteria.
2. A 4-day average will be used to assess compliance with the 4-day chronic criteria. There are two options for obtaining a 4-day average:

   - A composite sample that spans at least 2 calendar days.

   OR

   - An average calculated from samples collected on at least 2 days within a 4-day period.

Constant and calculated criteria

The criterion for each toxic substance is either a constant value or a calculated value. Toxic substances with constant criteria have explicit numeric values in Table 240(3) in WAC 173-201A-240. The toxicity of some substances are dependent on ambient conditions of the waterbody such as hardness, temperature, or pH and results from these parameters are used to calculate the numeric criterion for a given sampling location and time. These calculations are

[2] A 24-hour average duration is also used for the acute criteria for PCBs.

also given in Table 240(3). The important thing to note is that a calculated criterion is not a fixed value; the criterion value may vary throughout the course of a day or season due to fluctuations in water hardness, temperature, and/or pH.

Assessment of the acute and chronic criteria

Water quality data are reduced to a "daily values" before category determinations are made. In cases where multiple samples are collected in one calendar day, the highest value (most toxic concentration) will be used as the daily value. For evaluating compliance with criteria that apply to a time period of 24 hours or less, the daily value will be directly compared to the criteria.

It is preferable to evaluate compliance with a 4-day chronic aquatic life criterion using an average sample value derived from multiple samples collected over a period of 4 days. However, this type of sampling is rarely completed. In lieu of this, there are two methods for obtaining an multi-day average that will be considered representative of a 4-day period:

- A composite sample that spans 2 or more calendar days

OR

- Averaging the results from multiple discrete samples:
  - For parameters that have constant criteria, an average will be calculated using at least 2 daily values within a 4-day period.
  - For parameters that have calculated criteria (which prevents a direct comparison of an sample average to a single criterion value), an average will be determined by using an exceedance factor method as follows:
    - The specific criterion for a daily value is calculated using the required ancillary data.
    - The daily value is divided by the calculated criterion to yield an exceedance factor.
    - When 2 or more daily values are available for a 4-day period, the average exceedance factor is determined. An average greater than 1 indicates an exceedance of the 4-day chronic criterion. An average less than or equal to 1 indicates a non-exceedance.

It is recognized that the available data may not fulfill the calculation requirements to generate a 4-day average, however the data may still indicate a chronic issue. For example, data collected by weekly or monthly sampling schedules yield only one daily value in a 4-day period, therefore averaging is not possible. However, the regular weekly or monthly samples over time may indicate an ongoing problem. In situations where there are multiple daily values that cannot generate a 4-day average, the individual daily values will be directly compared to the 4-day chronic criteria.

Notes on parameter-specific data requirements and information are located at the end of this section.

Category Determinations

Category 5

An AU will be placed in Category 5 for a toxic pollutant in the water column when:

- Two or more daily values within a three-year period exceed an acute aquatic life criterion.

OR

- One daily value exceeds an acute criterion and one 4-day average exceeds a 4-day chronic criterion within a three year period. The acute and chronic criteria evaluation periods may temporally overlap.

OR

- Two or more daily values within a three-year period exceed a 24-hour chronic aquatic life criterion.

OR

- Two or more 4-day averages exceed a 4-day chronic aquatic life criterion in a three-year period. The 4-day averaging periods cannot overlap.

OR

- In a three-year period, there are three or more instances where only one daily value is available in any 4-day period and the value exceeds a 4-day chronic criterion.

In addition to the state and federal numeric criteria, an AU may be placed in Category 5 if bioassay tests show adverse effects as measured by a statistically significant response relative to a reference or control (WAC 173-201A-240(2)), and the source of impairment is known to be a pollutant. These tests will be evaluated by Ecology staff and documented on a case-specific basis consistent with WAC 173-201A-240.

Category 4

An AU will be placed in Category 4A when EPA has approved a TMDL for toxic substances.

An AU will be placed in Category 4B when EPA approves use of a pollution control program for toxic substances.

Category 3

An AU will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's WQA database for future use. As additional data and information become available in future listing cycles, Ecology will again assess all available data to make a new category determination according to this policy.

Category 2

An AU will be placed in Category 2 for a toxic pollutant in the water column when there are exceedances of criteria, but the data does not qualify for placement in Category 5.

Category 1

Requirements for Category 1 placement depend on the prior Category assignment.

New listing or prior Category 2, Category 3, or Category 5 listing

An AU may be placed into Category 1 when:

- At least 20 daily values, each at least 4 days apart, within a three year period are available and there are no exceedances of an acute or chronic criterion. When multiple samples are

available within a 4-day period, they will be compared to any 4-day chronic criterion as previously described.

- If an AU is currently in Category 5 or Category 2, the sample data must be collected during any critical period that can be inferred from previous exceedances for that toxic substance in the waterbody.

Prior Category 4A or Category 4B listing

An AU that is currently in Category 4A or 4B may be placed into Category 1 for a toxic pollutant in the water column when:

- The TMDL or pollution control program is being actively implemented.
- Sample data represent the critical period that has been identified in the TMDL or pollution control program for the toxic substance in the waterbody.
- At least 10 daily values within a three year period are available and there are no exceedances of an acute or chronic criterion.

In certain cases, projects specifically designed to determine compliance with criteria may be appropriate or necessary to qualify a listing for Category 1. The findings of such studies may result in a listing being placed in Category 1 using different (i.e. greater or lesser) data requirements than the requirements listed above. Entities interested in conducting an assessment project to verify compliance with water quality standards are advised to contact Ecology.

Parameter-specific data requirements and information

For further information about the following parameters see WAC 173-201A, Table 240.

Metals

The water quality criteria for metals may be dependent on hardness, pH, and/or the laboratory method used (e.g. dissolved or total). Hardness or pH values from the same sampling event are required for the assessment of metals criteria which are dependent on these conditions. Modeled or otherwise estimated hardness values are not acceptable for the purpose of the WQA. Metals must be sampled using clean sampling and analytical techniques, or appropriate alternate sampling procedures or techniques. For guidance, see EPA, *Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*, 1996.

Arsenic

Total arsenic is used for water data when assessing compliance with aquatic life-based criteria.

Ammonia

The water quality criteria calculation for freshwater ammonia concentration requires sample values for temperature and pH collected during the same sampling event. Modeled or otherwise estimated temperature and pH values are not acceptable for the purpose of the WQA.

Dichlorodiphenyltrichloroethane (DDT)

Criteria exist for Total DDT. The sum of one or more isomers may result in an exceedance of the Total DDT criteria. For an aquatic life Category 1 determination, a value must be calculated from the sum of 4,4' and 2,4' isomers of DDT, DDD, and DDE sample values.

Chlordane

The sum of one or more of the following compounds may be compared to the criteria: cis- and trans-chlordane, cis- and trans-nonachlor, and oxychlordane. A Category 1 determination for aquatic life uses requires sample values for all compounds. Assessment of chlordane can also be based on technical chlordane results. In cases where both sets of results are available (technical chlordane and the sum of the five compounds above), the most protective comparison will be used in the Category determination.

Endosulfans

The sum of endosulfan I (alpha) and endosulfan II (beta) is compared to the aquatic life criteria. A Category 1 determination requires sample values for both compounds.

Aldrin/Dieldrin

The sum of aldrin and dieldrin are evaluated in comparison to the aquatic life criteria.

Helpful Documents

- EAP029 - Metals Sampling
- EAP001 - Conducting Studies Using Semi-Permeable Membrane Devices (SPMD)s
- EAP003 - Sampling Pesticides in Surface Waters
- EAP041 - Collecting Freshwater Suspended Particulate Matter Samples Using In-Line Filtration
- EAP079 - Semi-Permeable Membrane Devices (SPMD)s Data Management and Data Reduction
- EAP090 - Decontaminating Field Equipment for Sampling Toxics in the Environment
- EAP034 (Publication #17-03-207)- Collection, Processing, and Analysis of Stream Samples

2I. Toxics-Human Health Criteria

Designated Uses:	Fish and shellfish harvesting Water supply
Numeric Criteria:	WAC 173-201A-240 Federally promulgated criteria at 40 CFR 131.45
Narrative Standards:	WAC 173-201A-240(1); -260; -300
Unit of Measure:	*Water column data*: All substances must be reported in µg/L. *Tissue data*: All substances must be reported in µg/kg, wet weight, or dry weight converted to wet weight.

Assessment Information and Data Requirements

The three approaches for assessing toxics data for human health protection include:

1. **Directly assessing human health criteria (HHC) by conducting a statistically valid study to evaluate if HHC are being met**
2. **Evaluating the support of fish and shellfish harvest uses, primarily based upon tissue exposure concentrations (TEC).**
3. **Evaluating the support of domestic water supply uses, primarily based on drinking water exposure concentrations (DWEC).**

Category Determinations

The following three sub-sections provide category determination information for the protection of human health uses:

- 2I(1). Directly Assessing Human Health Criteria Attainment
- 2I(2). Fish and Shellfish Harvest Use Assessment
- 2I(3). Domestic Water Supply Use Assessment

The primary lines of evidence Ecology will use to evaluate toxic chemical levels for protection of human health are tissue data (i.e. from fish/shellfish) and water column data. A statistically valid study of contaminant levels in fish tissue from a waterbody will take precedence over the harvest use WQA methodology described in this policy. A statistically valid study of contaminant levels in the water column of a waterbody will take precedence over the domestic water supply use methodology described in this policy. A weight of evidence approach is built into the harvest use and domestic water supply evaluations when considering:

- Magnitude of exceedances
- Number of available samples
- Indications of persistence of a chemical in a waterbody

Ecology will consider other lines of evidence that are intended to assess the status of the designated uses individually, apart from the numeric HHC, and can be used in addition to the above lines of evidence related to the HHC:

- *Department of Health (DOH) Fish Advisories*: DOH Fish Advisories are directly related to harvest use impairment. However, fish consumption advisories are sometimes spatially extrapolated to portions of a waterbody from which data has not been actually collected (e.g. stream reaches adjacent to one from which data was collected). A fish consumption advisory may be used in the WQA process as an additional line of evidence for AUs from which data has actually been collected. It is anticipated that most waterbodies that have fish consumption advisories will already be in Category 5 based on the pathway associated the tissue exposure concentration (TEC) evaluation.
- *Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCL):* MCLs are intended to protect drinking water sources. However, MCLs are intended to be applied as a limit at water treatment facilities after the water has undergone conventional treatment. MCLs also incorporate other considerations that do not easily fit within the framework of the WQA (e.g. economic feasibility of treatment technology). Nonetheless, there may be examples of where MCL compliance data and information for a waterbody could be used in the WQA process as an additional line of evidence if they aren't already captured in the pathway using the drinking water exposure concentration (DWEC).

When appropriate, staff from Ecology's Water Quality and the Environmental Assessment Programs will confer to make a category assignment decision based on multiple lines of evidence available. Exceptions to the general designated use WQA methodology might occur in instances where it is verified that a toxin found in fish tissue does not have sources within the watershed in which the affected waterbody is located. These site specific determinations will be documented in the WQA listing record.

Notes on parameter-specific data requirements and information are located at the end of this section.

2I(1) Directly Assessing Human Health Criteria Attainment

The completion of a statistically rigorous study is the only pathway for directly evaluating whether or not the human health criteria are being met in a waterbody. A direct evaluation of human health criteria attainment has precedence over the water supply use assessment methodology described in this policy. Attainment of the human health criteria in the water column does not necessarily signify that the harvest use is supported. Entities would need to work with Ecology to design and implement a study to directly evaluate the attainment of human health criteria as it is not practical to describe the study requirements in this policy.

2I(2) Fish and Shellfish Harvest Use Assessment

Assessment of harvest use support will rely upon tissue exposure concentrations (TEC) of pollutants that are rooted in the human health criteria equations, but expressed as a stand-alone tissue consumption exposure route. TEC thresholds for carcinogenic and non-carcinogenic effects differ because the underlying assumptions associated with the two types of health effects are different.

#1. For chemicals that have non-carcinogenic effects (TEC_N):
(Reference dose) x (Body weight) ÷ Fish consumption rate = **TEC_N**

#2. For chemicals that have a carcinogenic effect level (TEC_C):
(Risk level) x (Body weight) ÷ (Cancer slope factor) x (Fish consumption rate) = **TEC_C**

Many carcinogens also have non-cancer health effects above certain concentrations. Chemicals that have non-carcinogenic effects in addition to carcinogenic health endpoints will be evaluated using the carcinogen threshold (TEC_C) as well as the non-carcinogen threshold (TEC_N). A listing for such a carcinogen may therefore qualify for Category 5 through the TEC_C Category 5 pathway and/or the TEC_N Category 5 pathway.

Data Evaluation for Tissue Samples

The following factors will be considered to determine what tissue data will be used for WQA purposes:

Species used and tissue characteristics

Edible portions (defined below) of any species will be used. Composite samples of edible fish and shellfish tissue will be evaluated, where edible tissue is defined as:

- Fin fish: fillet (with or without the skin intact)
- Crabs: muscle (hepatopancreas tissue will not be evaluated)
- Shellfish (i.e. clams, oysters, mussels, crayfish, etc.): whole-body, shell removed (either depurated or non-depurated)

Site fidelity for Category 5

In general, marine tissue samples must be from species with high site fidelity (e.g. a species that travels long distances is not likely to be representative of water quality conditions within the marine grid cell in which it is caught). Samples from anadromous fish will not be used to place freshwaters in Category 5. Similarly, samples must be from species that are in their primary

waterbody of residence. For example, data from lake-dwelling trout that are caught in tributary stream spawning habitat will not be used to place a stream AU in Category 5.

Age of fish

When information on the age of fish is available it may be considered in the evaluation of harvest use impairment when determining if the samples in the dataset are representative of the site.

Composite samples

Composite sample are made up of at least three individual fish. Only individuals of a single species can constitute an individual composite sample. The fish used in each composite should be of similar size (i.e. total length of smallest being no less than 75% the total length of the largest). All samples are treated as independent whether or not they were collected in the same day, season, or year.

- *Combining individual fish collected within a single AU into a quasi-composite sample value:* This applies when separate sampling events in a year each collected a fish from a certain species, but no one event collected enough individuals to make a composite sample for that event. Three or more individual fish from the same year will be combined to make one quasi-composite sample. The median value of the chemical among the individual fish used is assigned as the quasi-composite sample value.

Trophic level

Trophic level is irrelevant for listing in Category 5, but upper trophic levels of edible species are needed for moving from Category 5 and 4A/4B to Category 1 (Exception: shellfish can be used to list and delist for polycyclic aromatic hydrocarbons (PAHs) because they are a better indicator of contamination).

AUs represented by tissue data

Oftentimes it is necessary to collect fish from multiple locations in order to obtain a sufficient number of fish to create composite samples. This means that a single composite sample may have fish collected from two or more AUs. If fish are collected from more than one stream/river AU to constitute a composite sample, then the resulting listing will typically be applied to the AU containing the assigned EIM monitoring station location; the current convention is to assign the EIM station location to the midpoint of the total length of stream/river sampled. If fish are collected from more than one grid cell AU in marine waters or large lakes to constitute a composite sample, then the grid cell AU containing the centroid of the sample collection stations will be associated with the listing. Associating a single stream reach or grid cell with a listing is currently necessary due to data management constraints and is for visual display only. For this reason (and also since fish are mobile), it should not be interpreted that the displayed stream reach or grid cell AU represents the true spatial extent of a harvest use impairment.

Data analysis

In general, composite samples for each species will be aggregated for the entire period of time that the assessment cycle is addressing (e.g. estimating the median composite sample value for all samples collected from a given species within a 10 year period). In some cases however, more weight will be given to the most recent years with data if it is apparent that an increasing or

decreasing trend in a pollutant concentration has occurred. The remarks section of a listing will note when shorter time periods are used for data aggregation.

For each species, the median the composite sample value will be separately compared to the applicable TEC threshold(s). If only a single sample value is available for a species, then that sample value will be designated as the median. This method will use the reported numeric value for data points that are J-flagged as estimates (not including UJ and NJ flagged values). If a TEC threshold and a sample value are both below the laboratory method detection limit, it is not possible to determine if the sample is exceeding the threshold or not.

Magnitude of exceedance

The magnitude of exceedance factor differs for carcinogenic and non-carcinogenic effect thresholds because:

1. In general, the risk associated with carcinogenic effects is based on a long-term time scale (a lifetime or 70 years) while non-carcinogenic effect thresholds are based on a short to intermediate time scale
2. The values of the TEC_C thresholds are less certain than the values of the TEC_N thresholds because the slope of the cancer potency factor is extrapolated below the range of experimental results, while non-carcinogenic effects are not extrapolated in this way
3. Since many of the TEC_C thresholds are at values near or below laboratory method detection limits, the error rate for comparing sample values to a TEC_C threshold is inherently greater relative to comparison to a TEC_N.

Category Determinations for Fish and Shellfish Harvest Use

Category 5

Carcinogens

An AU will be placed in Category 5 when:

- The median composite sample value(s) from one or more species exceeds the TEC_C by a factor of 10 to 100. A minimum of 3 samples is required.
    - How this works: All of the species with a median value exceeding 10 times the TEC_C are identified. If the total number of samples among the species is three or more, then the AU qualifies for Category 5.

OR

- The median composite sample value(s) from one or more species exceeds the TEC_C by a factor greater than 100. A minimum of 2 samples is required.
    - How this works: All of the species with a median value exceeding 100 times the TEC_C are identified. If the total number of samples combined among these species is two or more, then the AU qualifies for Category 5.

Non-carcinogens (and carcinogens that also have a TEC_N threshold)

An AU will be placed in Category 5 when:

- The median composite sample value(s) from one or more species exceeds the TEC_C by a factor of 1 to 10. A minimum of 3 samples is required.
    - How this works: All of the species with a median value exceeding the TEC_N are identified. If the total number of samples among the species is three or more, then the AU qualifies for Category 5.

OR

- The median composite sample value(s) from one or more species exceeds the TEC_N by a factor greater than 10. A minimum of 2 samples is required.
    - How this works: All of the species with a median value exceeding 10 times TEC_N are identified. If the total number of samples among the species is two or more, then the AU qualifies for Category 5.

- De-listing from Category 5 to Category1 or 2 can occur if additional data in a subsequent assessment cycle results in a shift in the median composite sample value(s) below the lowest applicable TEC threshold.

Category 4

An AU will be placed in Category 4A for a given parameter when EPA approves a TMDL for a toxic substance in an AU.

An AU will be placed in Category 4B for a given parameter when EPA approves use of a pollution control program for a toxic substance in an AU.

Category 3

For all carcinogens and non-carcinogens, an AU will be place in Category 3 if there are no exceedances of a TEC, but the data does not qualify for any other category.

Category 2

For Carcinogens and Non-carcinogens

An AU will be placed in Category 2 for a given parameter when there are exceedances of a TEC, but the data does not qualify for Category 5 or Category 1.

- Applies to all species, including those caught in migration or that have low site fidelity (e.g. salmon & steelhead).
- A listing can potentially move out of Category 5 and into Category 2 in a subsequent WQA cycle when additional new data result in a dataset that does not qualify for Category 5. This would require an individual review of the listing by the assessor prior to the final category designation.

Category 1

Requirements for Category 1 placement depend on whether an AU is a new listing or was in Category 2, 3, or 5 in the previous WQA cycle, or was in Category 4A or 4B in the previous WQA cycle.

An AU may be placed into Category 1 for a new listing or previous Category 2, 3, or 5 listing when the following are met:

Carcinogens

The median composite sample values for two or more upper trophic level species are below the TEC_C.

- Only species with high site fidelity are used in the evaluation.
- There must be a total of at least 10 composite samples among all species sampled.
- All species sampled must have a median below the TEC_C.
- No single sample is greater than 100 x TEC_C.
- Exception for polycyclic aromatic hydrocarbons (PAHs): only bivalve species are used.

Non-carcinogens

The median composite sample values for two or more upper trophic level species are below the TEC_N

- Only species with high site fidelity are used in the evaluation.
- There must be least 10 composite samples for all species combined.
- All species sampled (if more than 2) must have a median below the TEC_N.
- Exception for PAHs: only bivalve species are used.
- No value is more than 10 x TEC_N.

When a listing was in Category 4A or 4B in a prior assessment cycle

For both carcinogens and non-carcinogens, an AU may be placed into Category 1 for a previous Category 4A or 4B listing when a TMDL effectiveness study or similar study findings conclude that the harvest use is no longer impaired. These projects may result in a listing being placed in Category 1 using different (i.e. greater or lesser) data requirements than the requirements listed above.

2I(3). Domestic Water Supply Use Assessment

Evaluating Data for Domestic Water Supply

Assessment of the drinking water use support will rely upon drinking water exposure concentrations (DWEC) that are rooted in the human health criteria equations, but are expressed solely as a water ingestion exposure pathway. The derivations of the DWEC for carcinogenic and non-carcinogenic effects differ because the underlying assumptions associated with the two types of health effects are different.

#1. For chemicals that have a non-carcinogenic effects level ($DWEC_N$):
(Reference dose) x (Body weight) ÷ Drinking water rate = $DWEC_N$

#2. For chemicals that have a carcinogenic effect levels ($DWEC_C$):
(Risk level) x (Body weight) ÷ (Cancer slope factor) x (Drinking water rate) = $DWEC_C$

Many carcinogens also have non-cancer health effects above certain concentrations. Chemicals that have non-carcinogenic effects in addition to carcinogenic health endpoints will be evaluated using both the carcinogen threshold ($DWEC_C$) and non-carcinogen threshold ($DWEC_N$). A listing for such a carcinogen may therefore qualify for Category 5 through the $DWEC_C$ Category 5 pathway and/or the $DWEC_N$ Category 5 pathway.

Data Evaluation for Water Column Samples

The following factors are used to determine what water column data will be used for WQA purposes:

Sampling methods
Data from "grab samples" will be the primary means for assessing the domestic water supply use. Data from standardized "pre-concentration" sampling methods (e.g. high-volume water samplers) may be considered in the evaluation.

Sample independence
Samples collected at least 24 hours apart are treated as independent.

Data analysis
Data from the most recent 10 years will be used. The category determination is based on the proportion (i.e. a percentile or percentage) of sample values exceeding or not exceeding the applicable DWEC threshold(s). For determining sample value, this method will use the reported numeric value for data points that are J-flagged as estimates (except UJ and NJ flagged values). If a DWEC is below a detection limit and a sample value is below the detection limit, it is not possible to determine if the sample is exceeding the threshold or not.

Category Determinations for Domestic Water Supply

Category 5

- Both Category 5 pathways apply to carcinogens that also have non-carcinogenic effects
- De-listing to another category can occur in subsequent listing cycles if threshold exceedances are not met.

- A final quality control review on the laboratory data may be completed when the water data qualifies a listing for Category 5. The evaluation will consider associated "blank" sample values in relation to the ambient sample values that exceed the criteria. Since the $DWEC_C$ and $DWEC_N$ thresholds represent very low concentrations, the likelihood for sample blank values to exceed the human health criteria is amplified, and therefore the possibility of false positives in ambient samples is also amplified. If a "blank" sample value is greater than an associated ambient sample value, then the sample value will be culled from the evaluation. Likewise, sample values exceeding the associated "blank" value by an insignificant amount (e.g. by a factor of 3 - 10) may also be culled from the evaluation; a specific factor is not specified here because for each sample value it is important to take into account specific lab and analytical method considerations.
- Exceeding the $DWEC_C$ or $DWEC_N$ does not necessarily mean that an AU has an impaired domestic water supply use. Ecology may consider additional lines of evidence in order to determine the appropriateness of a 303(d) listing. The assessor may review tissue data and information on potential sources of the chemical in order to better understand the reason(s) for the observed levels of the chemical in the water and ascertain the likelihood of its persistence in the waterbody. The assessor's considerations may include data and information from the same AU as well as from an adjacent or nearby AUs (e.g. upstream or downstream stream reaches). The assessor may also consider the number and types of fish and shellfish species in which the chemical has been observed and the levels of the parameter in such species. An assessor may determine that a Category 5 listing is appropriate even if the water data is the only line of available evidence. The rationale for the final listing decision will be presented in the remarks of the listing record.

Carcinogens

An AU will be placed in Category 5 when the median sample concentration exceeds the $DWEC_C$ and there is evidence of persistence of the chemical in the AU.

- A minimum of two exceedances is required.
- Exceedances of the $DWEC_C$ must occur in two or more water years or the parameter has been detected in fish/shellfish tissue during the last 10 years; must have freshwater bivalve data for PAHs.

Non-Carcinogens (and carcinogens that also have a $DWEC_N$)

An AU will be placed in Category 5 for a parameter when more than 10% of samples exceed the $DWEC_N$ and there is evidence of persistence of the chemical in the AU.

- A minimum of two exceedances is required.
- Exceedances of the $DWEC_N$ must occur in two or more water years or the parameter has been detected in fish/shellfish tissue during the last 10 years; must have freshwater bivalve data for PAHs.

➢ De-listing from Category 5 to Category 1 or 2 can occur if additional data in a subsequent assessment cycle results in the requirements listed above not being met (e.g. if additional samples shift the median concentration below the $DWEC_C$ or result in less than 10% of samples exceeding the DWECN)

Category 4

An AU will be placed in Category 4A for a given parameter when EPA approves a TMDL for a toxic substance in an AU.

An AU will be placed in Category 4B for a given parameter when EPA approves use of a pollution control program for a toxic substance in an AU.

Category 3

For all carcinogens and non-carcinogens, an AU will be place in Category 3 if the data does not qualify for any other category; or it may be placed in Cat 1, 2, or 5 based on an individualized review of the available data.

Category 2

For all carcinogens and non-carcinogens, an AU will be placed in Category 2 for a given parameter when there are exceedances of a DWEC, but the data does not qualify for Category 5 or Category 1.

Category 1

Requirements for Category 1 placement depend on whether an AU is a new listing or was in Category 2, 3, or 5 in the previous WQA cycle, or was in Category 4A or 4B in the previous WQA cycle. An AU may be placed into Category 1 for a new listing or previous Category 2, 3, or 5 listing when the following are met:

Carcinogens and Non-carcinogens

- More than 90% of sample values are below the $DWEC_C$ or $DWEC_N$:
- There must be a total of 25 or more samples collected in 3 or more water years.
- Exception for polycyclic aromatic hydrocarbons (PAHs): only bivalve species are used.
- No sample is greater than 100 x $DWEC_C$ or is greater than 10 x $DWEC_N$.

AUs previously in Category 4A or 4B:

For both carcinogens and non-carcinogens, an AU may be placed into Category 1 for a previous Category 4A or 4B listing when a TMDL effectiveness study or similar study findings conclude that the water supply use is no longer impaired. These projects may result in a listing being placed in Category 1 using different (i.e. greater or lesser) data requirements than the requirements listed above.

Parameter-specific data requirements and information

For further information about the following parameters see WAC 173-201A, Table 240 and federally promulgated criteria at 40 CFR 131.45.

2, 3, 7, 8-TCDD (Dioxin)

There is not a TEC_C nor a $DWEC_C$ threshold for 2,3,7,8-TCDD because the validity of the existing cancer slope factor developed by EPA is uncertain and currently under review. In the final rule at 40CFR131.45 EPA notes that for 2,3,7,8-TCDD, IRIS does not currently contain a measure of dioxin's cancer-causing ability (*i.e.,* a CSF). Without such values, EPA concluded that further analysis is necessary in order to promulgate scientifically sound revised criteria for 2,3,7,8-TCDD. In the Technical Support Document issued in November 2016 as part of EPA's partial approval/disapproval of Washington's human health criteria, EPA noted its intent to reevaluate the existing federal 2,3,7,8-TCDD human health criteria in IRIS by 2018. EPA noted it that was withdrawing its federal proposal of proposed criteria for 2,3,7,8-TCDD, given the uncertainty regarding aspects of the science, and was taking no action on Washington's 2,3,7,8-TCDD criteria. As a default EPA left the existing criteria from the NTR in effect for Washington. Therefore, the harvest use and domestic water supply use assessment approaches have no pathways to 303(d) listing based on carcinogenic effects. Evaluating 2,3,7,8-TCDD at carcinogenic effect levels must occur using the human health criteria approach.

Ecology will evaluate domestic water supply use support by comparing the $DWEC_N$ to 2,3,7,8-TCDD water column values. Ecology will evaluate harvest use support by comparing tissue 2,3,7,8-TCDD levels to the TEC_N threshold. Any detection of 2,3,7,8-TCDD in freshwater or in fish tissue will result in a Category 2 listing, unless the data warrants placement in Category 5 based on exceedances of the $DWEC_N$ or TEC_N. There will also be no pathway to Category 1 based on TEC or DWEC thresholds. Existing Category 5 listings for 2,3,7,8-TCDD (established using the NTR numbers) will remain in Category 5 pending an appropriate methodology to assess concentrations based on cancer effect levels.

2,3,7,8-TCDD Toxic Equivalency Quotient: The 17 PCDD/F congeners have different levels of toxicity compared to 2,3,7,8-TCDD, the most toxic form. To assess the cumulative risks to human and environmental health, the congener concentrations are expressed as toxic equivalents (TEQs). The TEQ is calculated by multiplying each congener result by its congener-specific toxicity equivalent factor (TEF) and then summing to obtain the overall TEQ. Calculated TEQ values will be assessed using the 2,3,7,8 TCDD TEC_N and $DWEC_N$ thresholds. An exceedance of a threshold will typically result in a Category 2 determination, but in some cases may result in a Category 5 determination where the evidence of a designated use impairment is apparent.

Aldrin/Dieldrin

For harvest and water supply uses, aldrin and dieldrin are separately compared to the criteria, tissue exposure concentrations and drinking water exposure concentrations.

Arsenic

There is no TEC_C or $DWEC_C$ for arsenic because the validity of the existing cancer slope factor developed by EPA is uncertain and currently under review. In a Technical Support Document issued in November 2016 as part of EPA's partial approval/disapproval of Washington's human

health criteria, EPA noted its intent to reevaluate the existing federal arsenic human health criteria through the Integrated Risk Information System (IRIS) Toxicological Review of inorganic arsenic (total dissolved) by 2018. Given the scientific uncertainty of the cancer toxicity factors, EPA withdrew its proposal for revising criteria for arsenic in Washington and as a default left the existing criteria from the National Toxics Rule (NTR) in effect for Washington. Therefore, the harvest use and domestic water supply use assessment approaches have no pathways to 303(d) listing based on carcinogenic effects. Evaluating arsenic at carcinogenic effect levels must occur using the approach to directly evaluate attainment of human health criteria.

Ecology will evaluate domestic water supply use support by comparing the $DWEC_N$ to total dissolved (filtered) arsenic data, with the assumption that all dissolved arsenic is of the inorganic fraction. The value of the $DWEC_N$ is equal to the MCL (10µg/L) set by the Safe Drinking Water Act for protecting drinking water supplies. Ecology will evaluate harvest use support by comparing total inorganic arsenic levels in tissue using to the TEC_N threshold. Any detection of arsenic in fish tissue will result in a Category 2 listing, unless the data warrants placement in Category 5 based on exceedances of the TEC_N. There will also be no pathway to Category 1 based on TEC or DWEC thresholds. Existing Category 5 listings for inorganic arsenic (established using the NTR numbers) will remain in Category 5 pending an appropriate methodology to assess concentrations based on the cancer effect level. When credible studies that address natural background levels of arsenic are available, Ecology will consider this information in making impairment listing decisions.

Chlordane

The sum of one or more of the following compounds may be compared to the criteria, tissue exposure concentrations, or drinking water exposure concentrations: cis- and trans-chlordane, cis- and trans-nonachlor, and oxychlordane. A Category 1 determination for water supply or harvest uses requires sample values for all compounds. Assessment of chlordane can also be based on technical chlordane results. In cases where both sets of results are available (technical chlordane and the sum of the five compounds above), the most protective comparison will be used in the Category determination.

Dichlorodiphenyltrichloroethane (DDT)

Criteria exist for individual isomers of DDT. For harvest and water supply uses, tissue and water data for DDT and its isomers will be compared to the criteria, tissue exposure concentrations, and drinking water exposure concentrations.

Endosulfans

For human health, alpha-endosulfan, beta-endosulfan, and endosulfan-sulfate (either separate or summed) in tissue and water can be used in a Category 5 determination. Sample values for all compounds must be available for harvest and water supply use for Category 1 determinations.

Polychlorinated biphenyls (PCBs)

For PCBs in tissue or water, total PCBs (i.e. the sum of all congeners, isomers, homologs or Arochlor results) will be compared to the water and tissue thresholds.

Methylmercury

The numeric human health criterion for methylmercury is expressed as a fish tissue concentration. Category determinations for this parameter will employ the tissue criterion and follow the evaluation pathways described for non-carcinogens in the Fish and Shellfish Harvest Use Assessment section. Mercury and methylmercury in water will not be evaluated.

Helpful Documents

- EAP029 - Metals Sampling
- EAP001 - Conducting Studies Using Semi-Permeable Membrane Devices (SPMD)s
- EAP003 - Sampling Pesticides in Surface Waters
- EAP007 - Resecting Finfish Whole Body, Body Parts or Tissue Samples
- EAP008 - Resecting DNA Samples and Aging for Finfish
- EAP009 - Collection, Processing and Preservation of Finfish Samples
- EAP079 - Semi-Permeable Membrane Devices (SPMD)s Data Management and Data Reduction
- EAP090 - Decontaminating Field Equipment for Sampling Toxics in the Environment
- EAP034 (Publication #17-03-207)- Collection, Processing, and Analysis of Stream Samples

~~**i. Toxic Substances**~~ [THIS SECTION WAS REPLACED WITH 2 NEW SEPARATE SECTIONS FOR AQUATIC LIFE CRITERIA (2H) AND HUMAN HEALTH CRITERIA (2I)]

~~**Designated Uses:**~~	~~**Aquatic life**~~ ~~**Fish and Shellfish harvesting**~~ ~~**Recreational**~~ ~~**Water supply**~~
~~**Numeric Criteria:**~~	~~**WAC 173-201A-240**~~ ~~**40 CFR 131.36 - NTR**~~
~~**Narrative Standards:**~~	~~**WAC 173-201A-240(1); -260; -300**~~
~~**Unit of Measure:**~~	~~***Water column data*: All substances must be reported in µg/L except for ammonia and chloride which must be reported in mg/L.**~~ ~~***Tissue data*: All substances must be reported in µg/kg, wet weight, except dioxins/furans (ng/kg) and metals (mg/kg).**~~

~~***Assessment Information and Specific Data Requirements***~~
~~**Toxic pollutants have significant potential to adversely affect designated water uses, aquatic biota, and public health when present at levels above those defined in water quality standards. Therefore, assessment decisions for toxic pollutants are based on detection of these substances above safe levels, as defined by exceedances of either numeric criteria or narrative criteria, as determined by criterion tissue equivalent concentrations and fish advisories. For water column and tissue data, non-detects are not used to determine exceedances. When the criterion or criterion tissue equivalent concentration is less than the detection value these data will not be used for Assessment purposes because the detection level is not sensitive enough to ensure compliance with the criterion. A more sensitive analytical method should be used to determine into which category the parameter/segment combination belongs.**~~

~~**Measurements of instantaneous concentrations will be assumed to represent the averaging periods specified in the State surface water quality standards for both acute and chronic criteria unless additional measurements are available to calculate averages.**~~

~~**Data submitted for the assessment of toxic pollutants must be for the specific isomer, congener, chemical fraction, or compound group identified in the state water quality standards aquatic life criteria (WAC 173-201A-240(3)) or the National Toxics Rule human health criteria (40CFR131).**~~

~~**Fish and shellfish advisories issued by the state DOH or by local health departments, or similar advisories from other agencies based on credible monitoring programs under the federal Food and Drug Administration rules, may be used to directly assess a waterbody segment if site-specific information and data associated with the specific segment are provided to Ecology.**~~

Segments covered in whole or in part by a fish or shellfish advisory, based on site specific information and data for that segment, will be categorized as follows:

- If the risk assessment pollutant parameters or other assumptions used by the agency issuing the advisory are cumulatively less or no more protective than those incorporated into the state standards or the national human health-based water quality criteria (e.g., toxics or pathogens), the segment will be placed in Category 5 for the specific pollutant parameter.
- If the pollutant parameters or other assumptions used in issuing the advisory were based on more protective standards (that is, the advisory would be triggered by a less severe water quality criteria), then the segment will be placed in Category 2.

Parameter-specific data requirements and information

For further information about the following parameters see WAC 173-201A, Table 240(3).

- Metals

The water quality criteria for metals may be dependent on hardness, pH, and/or the laboratory method used (e.g. dissolved or total). Hardness or pH values from the same sampling event are required for the assessment of metals criteria which are dependent on these conditions. Modeled or otherwise estimated hardness values are not acceptable for the purpose of the Assessment.

Metals must be sampled using clean sampling and analytical techniques, or appropriate alternate sampling procedures or techniques. For guidance, see EPA, *Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels*, 1996.

- Arsenic

Total arsenic is used for water data when assessing compliance with aquatic life-based criteria. Inorganic arsenic is used when assessing compliance with human health-based criteria (both tissue and water data). Inorganic arsenic can be naturally elevated in shellfish in certain areas of the Puget Sound and requires a natural conditions evaluation prior to a final listing determination.

- Ammonia

The water quality criteria calculation for freshwater ammonia concentration requires sample values for temperature and pH collected during the same sampling event. Modeled or otherwise estimated temperature and pH values are not acceptable for the purpose of the Assessment.

- Polychlorinated biphenyls (PCBs)

The sum of PCB compounds or mixtures (all congener or all isomer or homolog or Arochlor analyses) may result in an exceedance of the criteria or criterion tissue equivalent concentration. Due to the number of these compounds and the varying levels of their toxicity, Ecology will review PCB analyte data to determine that the most common and most toxic PCB compounds have been included in the Assessment value before placing a waterbody in Category 1 for this parameter.

- Dichlorodiphenyltrichloroethane (DDT)

Criteria for both Total DDT (aquatic life-based criteria) and criteria for individual isomers of DDT (human health-based criteria) will be considered in the assessment. The sum of one or more isomers may result in an exceedance of the Total DDT criteria. For a Category 1

~~determination, a value must be calculated from the sum of 4,4' and 2,4' isomers of DDT, DDD, and DDE sample values. Tissue data will be compared to the criterion tissue equivalent concentration for DDT and its isomers.~~

- ~~2,3,7,8-TCDD Toxic Equivalents~~

~~The 17 PCDD/F congeners have different levels of toxicity compared to 2,3,7,8-TCDD, the most toxic form. To assess the cumulative risks to human and environmental health, the congener concentrations are expressed as toxic equivalents (TEQs). The TEQ is calculated by multiplying each congener result by its congener-specific toxicity equivalent factor (TEF) and then summing to obtain the overall TEQ. Calculated TEQ values will be assessed using the 2,3,7,8-TCDD criterion and criterion tissue equivalent concentration. An exceedance of the criterion or criterion tissue equivalent concentration will result in a Category 2 determination.~~

- ~~Chlordane~~

~~The sum of one or more of the following compounds may result in an exceedance of the criteria or criteria tissue equivalent concentrations: cis- and trans-chlordane, cis- and trans-nonachlor, and oxychlordane. To determine that a waterbody meets the criteria or criteria tissue equivalent concentration and should be placed in Category 1, sample values for all compounds must be available. Assessment of chlordane can also be based on technical chlordane results. In cases where both sets of results are available (technical chlordane and the sum of the five compounds above) the most protective value will be used.~~

- ~~Endosulfans~~

~~For water, the sum of endolfan I (alpha) and endosulfan II (beta) are compared to the aquatic life criteria. For tissue, the recommended approach is to compare the criterion tissue equivalent concentration to the sum of alpha-endolfan, beta-endosulfan, and endosulfan-sulfate. However, an exceedance of the criterion may also occur from applying tissue equivalent concentrations to the individual compounds.~~

~~The NTR's human health criteria in 40 CFR Part 131 (Federal Register Vol. 57, No. 246, and as updated) apply to waters in the State. These human health criteria are in addition to the aquatic life-based toxics criteria found in the state standards.~~

~~The Assessment of a toxic pollutant is based on data from either of two media, water column and tissue. An assessment of data from either medium may result in placement of the water body into the appropriate category.~~

~~*Aquatic life water column criteria:* Metals must be sampled using clean sampling and analytical techniques, or appropriate alternate sampling procedures or techniques. (For guidance, see EPA, *Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels,* 1996.)~~

~~Toxic substances criteria may vary depending on salinity concentrations in brackish waters of estuaries. In these cases, the method to determine salinity as described in WAC 173-201A-260(3)(e) will apply. If salinity data are not available or a marine/freshwater delineation has not been made by Ecology, the more stringent criterion will apply.~~

~~*Tissue:* Criteria tissue equivalent concentrations are back-calculated to surface water concentrations using bioconcentration factors (BCF) that were used to derive the human health criteria in the NTR. These values are from EPA *1980 Ambient Water Quality Criteria* documents, (www.epa.gov/waterscience/criteria/1980docs.htm). Many of these BCFs are listed in the *Human Health Criteria Calculation Matrix for EPA's 2002 National Recommended Ambient Water Quality Criteria* list (http://www.epa.gov/waterscience/criteria/history.htm).~~

~~NTR human health criteria for water and equivalent fish tissue concentrations used to assess tissue data can be found at Ecology's website at: http://www.ecy.wa.gov/programs/wq/swqs/toxics.html.~~

~~All tissue samples used for the Assessment must be from resident fish. Fin fish fillet tissue samples, whole shellfish tissue samples, and edible shellfish muscle samples must have at least three single fish samples or a single composite sample made up of at least three separate fish of the same species. Fin fish fillet tissue samples may be analyzed with skin on or skin off.~~

~~Where a study area of tissue samples spans multiple waterbody segments and the catch sites are identified, all waterbody segments containing a catch site will be categorized together. A valid rationale about why the pollutants in fish caught in different segments appear to be related must be included. Where a general area is identified, but with no specific catch sites, the lowest downstream segment (rivers) or the most probable centroid segment (open waters) will be placed in the appropriate category.~~

~~Category 1 Determination~~

~~*Water column data:* A segment will be placed in Category 1 for an aquatic life toxic pollutant when all of the following apply:~~

- ~~At least 10 sample values within a three year period are available.~~
- ~~All available data have been provided.~~
- ~~Sample data represent any critical period that has been identified in the waterbody for that pollutant.~~

~~*Tissue data:* A waterbody segment will be placed in Category 1 for a specific pollutant when no exceedances of the human health criteria are present in the most recent tissue data from resident species for that pollutant.~~

~~Category 2 Determination~~

~~*Water column data:* A segment will be placed in Category 2 for a toxic pollutant if any one sample value exceeds the aquatic life criteria and the waterbody segment is not otherwise listed in Category 5 for the pollutant. If two or more samples values exceed thecriteria but were not collected within a three-year period, the segment will be placed in Category 2.~~

~~*Tissue data:* A segment will be place in Category 2 when any one single-resident fish sample exceeds the human health criteria and the segment is not otherwise listed in Category 5 for the pollutant.~~

~~Category 3 Determination~~

~~A waterbody segment will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's assessment database for future use. As additional data and information become available, Ecology will again assess all available data to make a new category determination according to this policy.~~

~~Category 4 Determination~~

~~A segment will be placed in Category 4a when EPA has approved a TMDL for toxic substances. A segment will be placed in Category 4b when EPA approves use of a pollution control program for toxic substances. Category 4c does not apply to pollutant parameters.~~

~~Category 5 Determination~~

~~Water column data:~~ **~~A segment will be placed in Category 5 due to a toxic pollutant in the water column when two or more samples within a three-year period exceed the aquatic life criteria.~~**

~~Tissue data:~~ **~~A waterbody segment will be placed in Category 5 for a specific pollutant when exceedances of the human health criteria are present from resident species for that pollutant. A segment will be placed in Category 5 if either the mean of the three single-resident fish samples with the highest concentration of a given pollutant or one composite sample made up of at least three resident fish exceed the criteria.~~**

~~In addition to the state and federal numeric criteria, a segment will be placed in Category 5 if bioassay tests show adverse effects as measured by a statistically significant response relative to a reference or control (WAC 173-201A-240(2)), and the source of impairment is known to be a pollutant. These tests will be evaluated by Ecology staff and documented on a case-specific basis consistent with WAC 173-201A-240.~~

~~Category Change from a Previous Category 5 Listing~~

~~A Category 5 determination will be changed if a more recent assessment qualifies a waterbody segment for placement in another category.~~

~~A more recent toxic pollutant assessment that results in a Category 5 change must be based on data from the same medium (tissue or water column) and numeric criterion as was assessed to determine initial impairment. The change of a Category 5 determination may also occur if information from a TMDL or verification study confirms that the impairment no longer exists.~~

~~Due to local migration of species, toxic pollutant tissue studies that collect samples near Category 5 waterbody segments may be sufficient to represent more recent water quality conditions of the local area. In this case, tissue data and rationale that the samples collected from an adjacent or nearby waterbody segment are comparable may be considered for change in category determination.~~

2J~~j~~. Turbidity

Designated Uses:	Aquatic life
Numeric Criteria:	WAC 173-201A-200(1)(e) WAC 173-201A-210(1)(e)
Narrative Standards:	WAC 173-201A-260 & -300
Unit of Measure:	Nephelometric Turbidity Units (NTUs)

Assessment Information and ~~Specific~~ Data Requirements
Turbidity criteria are expressed as the difference between an upstream or background value and the increased value derived at a location downstream of a source of turbidity. For rivers, the background value for turbidity is gathered at a location upgradient from the activity that is being investigated. In lakes and open marine waters, the background value is the ambient conditions outside of the impacted area. Depending on the designated aquatic life use of the water body, the acceptable difference is either 5 or 10 NTUs over background when the background is 50 NTUs or less. When background is greater than 50 NTUs, the acceptable maximum increase is either 10 or 20 percent. If more than one sample value is available for the same location and day, the average sample value will be used in the assessment. The downstream and upstream (or background) values are averaged independently.

Category Determinations [NOTE: CATEGORY DETERMINATIONS HAVE BEEN REVERSED, FROM CATEGORY 5 TO CATEGORY 1, AND EDITED]

Category 5 ~~Determination~~
An AU will be placed in Category 5 if ten percent or more sample values in the latest ten years exceed the applicable criterion. A minimum of three exceedances is required for an impairment determination.

Category 4 **~~Determination~~**
~~A segment~~An AU will be placed in Category ~~4a~~4A when EPA has approved a TMDL for turbidity. ~~A segment~~

An AU will be placed in Category ~~4b~~4B when EPA approves use of a pollution control program for turbidity. ~~Category 4c does not apply to pollutant parameters.~~

Category 3 ~~Determination~~
~~A waterbody segment~~An AU will be placed in Category 3 when the available data are insufficient for any other category determination. This information will be maintained in Ecology's ~~assessment~~WQA database for future use. As additional data and information become available in future listing cycles, Ecology will again assess all available data to make a new category determination according to this policy.

Category 2 ~~Determination~~

~~A waterbody segment~~An AU will be placed in Category 2 if the threshold for placement in Category 5 is not achieved but there are events demonstrating exceedance in the latest ten years. A minimum number of samples is not required for a Category 2 determination.

Category 1 ~~Determination~~

~~A~~ An AU will be placed in Category 1 when a minimum of ten sample sets have been collected during separate storm runoff events ~~is necessary for a Category 1 determination. If~~, and no more than 5 percent of all available data exceeds the criterion~~, the waterbody segment will be placed in Category 1~~.

Helpful Documents

- EAP018 - Turbidity Threshold Sampling
- EAP034 (Publication #17-03-207)- Collection, Processing, and Analysis of Stream Samples

PART 3: Specific Assessment Considerations for Sediment Quality Criteria

[THIS SECTION WAS MOVED FROM 8A IN THE 2012 -DOCUMENT]

Designated Uses:	Aquatic life
Numeric Criteria:	WAC 173-204 - Sediment Management Standards
Narrative Standards:	WAC 173-204-100(3)
Unit of Measure:	Depending on chemical constituent: -mg/kg dry weight (ppm dry) OR -µg/kg dry weight (ppb dry) OR -mg/kg organic carbon (ppm carbon) OR Biological data

Assessment Information and Data Requirements

Regulatory Authorities

The *Sediment Management Standards* (SMS), WAC 173-204 (), are administered by Ecology's Toxics Cleanup Program (TCP) and include:

- Part I, General Information (WAC 173-204-100 through 173-204-130).
- Part II, Definitions (WAC 173-204-200).
- Part III, Sediment Quality Standards (WAC 173-204-300 through 173-204-350).
- Part IV, Sediment Source Control (WAC 173-204-400 through 173-204-420).
- Part V, Sediment Cleanup Standards (WAC 173-204-500 through 173-204-590).
- Part VI, Sampling and Testing Plans/Recordkeeping (WAC 173-204-600 through 620).

Parts I - IV were promulgated under the authority of Chapter 90.48 RCW, *Water Pollution Control Act*, and Chapter 70.105D RCW, *Model Toxics Control Act* (MTCA), to establish marine, low salinity, and freshwater surface sediment management standards for the state of Washington and are therefore EPA approved water quality standards. Part V was promulgated exclusively under the authority of MTCA, to establish marine, low salinity, and freshwater surface sediment cleanup standards for the state of Washington. Part V are not EPA approved water quality standards and therefore is not used as water quality standards in this WQA.

Data Requirements

Sediment data used in this WQA may be based on either chemical or biological data. The following requirements must be met for data to be acceptable for this WQA.

- The samples must be taken from surface sediments 0 – 16 centimeters in depth (the acceptable default for the biologically active zone under the WQA). Any depth interval from 0 – 16 centimeters can be used to determine compliance with the SMS criteria.
- Sediment data must be verified as error free in EIM. For information on the sediment data submission requirements refer to the TCP program's data requirements webpage.
- Data submitted must be for the specific isomer or chemical fraction addressed in the SMS criteria.
- Marine biological sediment tests must conform to WAC 173-204-315.
- Freshwater biological sediment tests must conform to WAC 173-204-340.
- The SMS [WAC 173-204-320(2)(a)] requires that, when laboratory results indicate an undetected chemical, the detection limit (e.g., practical quantitation limit and method detection limit) shall be reported to be at or below the Marine Sediment Quality Standards (SQS) chemical criteria.

Assessment Information

The Sediment Quality Standards (SQS, WAC 173-204-320) and the Sediment Impact Zone Maximum chemical (SIZmax, WAC 173-204-420) criteria are used in this WQA.

The most recent chemical and biological data will be used and can override older data on a station-by-station basis if it is in compliance with the SMS and Ecology requirements.

Only sediment data with appropriate detection limits are used in this WQA

Contaminated sediment listings are assigned to the appropriate quarter grid section of a full size rectangular grid (dividing the 2,460 feet by 3,660 feet grid into quarter sections).

Chemistry data for chemical quarter grid listings is evaluated using the following process:

- Within each quarter grid, up to 3 ChemStations (if available) with the highest chemical concentrations within the quarter grid are compared with the benthic SQS and SIZmax chemical values for each contaminant.
- For each ChemStation, chemistry points (ChemPoints) are assigned based upon the level of SMS chemical criteria exceedance as follows:
    - No exceedance of SMS chemical criteria = 0 ChemPoint,
    - SQS exceedance = 1 ChemPoint, and
    - SIZmax exceedance = 2 ChemPoints.
- The total ChemPoints for each quarter grid containing the 3 highest chemistry values (ChemPoints) are summed. This sum per quarter grid = *ChemScore*.
- The quarter grid is placed in the appropriate listing category as follows:
    - 0 ChemScore = Category 1
    - 1 and 2 ChemScore = Category 2
    - 3 ChemScore = Category 2

- 4 or greater ChemScore = Category 5 with the following exceptions: If an administrative override exists detailing that a Cleanup Action Plan (CAP) or its federal equivalent (Record of Decision [ROD] or Corrective Measure [CM]) is in place for that quarter grid or a sediment TMDL is in place for that quarter grid, then either a Category 4B or a Category 4A (TMDL) is designated. If both a sediment TMDL and a CAP, ROD or CM are in place, then the quarter grid is listed as Category 4B and the comments will indicate that a 4A (TMDL) is also in place for that quarter grid as well.

- If less than 3 ChemStations exist in a quarter grid, final listings are dependent upon the ChemPoint results of these limited number of ChemStations. In the case of less than 3 stations, for a ChemScore of less than 4 refer to Figure 1 below for detailed listing criteria using chemical data. It can result in a Category 3 or a Category 2 dependent upon the final ChemScore value.
- It should be noted that when a ChemScore results in a Category 2 designation, then Ecology will prioritize conducting confirmatory bioassay testing for these grids based upon funding and staffing availability as well as other critical criteria such as proximity to Category 4A and 4B listed areas, etc.

Confirmatory biological testing, in compliance with the SMS and Ecology requirements, may override chemical data. The biological point system (BioScore) used in this WQA is in compliance with the SMS WAC 173-204-315, where:

- When any two or more of the biological tests exceed the SQS at any one given station within a quarter grid, it is designated a SIZmax biological exceedance for that BioStation and that BioStation is assigned 2 BioPoints.
- When only one biological test exceeds the SQS at any one given quarter grid station, it is designated as an SQS exceedance for that station and that station is assigned 1BioPoint.
- Each station can have a maximum of 2 BioPoints, and there can be multiple spatially distinct and chemically similar stations per grid.
- Any combination of SQS and SIZmax exceedances that result in a total BioScore of 3 or greater within a given quarter grid would be required for a Category 5 biological listing. For example, this combination could equate to:
  - Three spatially distinct and chemically similar stations exceeding the biological SQS criteria (BioScore of 3), or
  - Two spatially distinct and chemically similar stations, one exceeding the SIZmax and one exceeding the SQS (BioScore of 3).
  - Two spatially distinct and chemically similar stations each of which exceed the SIZmax (BioScore of 4).

The following *preliminary assessment criteria* must be met for sampling stations for this WQA:

- Similar water depth
- Similar grain size
- Similar TOC
- Spatially distinct and overall chemically similar samples/stations

Category Determinations

Category 5

A quarter grid AU will be placed in Category 5 when it exceeds the below-listed ChemScore and BioScore criteria (WAC 173-204-420). See the sediment listing flowcharts below (Figure 1 and 2, *Category Determination for Contaminated Sediments*) for further details on category determinations. This generally includes quarter grids where:

- The ChemScore > 4 and/or
- The BioScore > 3.

Category 5 Administrative Override:

Sediment quarter grids or other sediment areas that would have been designated as meeting Category 1, 2 or 3 listing requirements using the standardized EIM data evaluation procedure, (Figure 3) but have instead been evaluated by EPA or Ecology technical staff using all available historical hard copy data not available in EIM, will be placed in Category 5. In other words, there may be quarter grids that would normally have been designated as meeting Category 1, 2 or 3 listing requirements if using only EIM electronic data and following the standard designation procedure. But, because they have been administratively determined by technical staff using historical, hard-copy data, they are placed in Category 5. This is done to accurately and transparently represent quarter grids using non-electronic non-EIM historical data.

For freshwater or low salinity sediments, assessment for potential listing of grids in Category 5 will be based on biological tests and the process outlined above in accordance with WAC 173-204-330 and 173-204-340. Based upon the site-specific flexibility allowed by these sections within the WAC, this evaluation will be performed on a case-by-case basis.

Category 4

A quarter grid AU will be placed in Category 4A when EPA has approved a TMDL for contaminated sediments.

A quarter grid AU will be placed in Category 4B when contaminated sites identified in Ecology's Integrated Site Information System database have an active cleanup in process documented through a legal administrative mechanism (i.e., Pollution Control Program) such as a CAP, ROD, CM, or other approved legally enforceable cleanup plan. AUs in Category 4B will be eligible to move to Category 1 when they meet sediment quality standards described in Part 3 of the SMS.

Category 5 listed quarter grids or other sediment areas that are, wholly or in part, within the boundaries of a cleanup site will be placed in Category 4B. In other words, there may also be quarter grids that are not in Category 5, but are within the boundaries of a cleanup site that will be placed in Category 4B. This is done to transparently represent grids included in the boundaries of the site defined by the Pollution Control Program documents (e.g., CAP, ROD, or CM). Refer to the flowchart (Figure 1). Various authorities are used to accomplish cleanup of contaminated sediment sites. Which authority is applied depends on the site, sources of contaminants, and sometimes even the liable persons and/or parties. Cleanup of sediment sites is primarily conducted using either CERCLA authority under the EPA Superfund program or under the SMS. Other supporting authorities are not exempted from cleanup consideration.

Category 3

A quarter grid AU will be placed in Category 3 when the available data are insufficient for any other category determination. For example, this could include sites where the ChemScore = 1 or 2 or where the *preliminary assessment criteria* are not met. This information will be maintained in Ecology's WQA database for future use. As additional data and information become available, during the next WQA Ecology will review all available data to make a new category determination according to this policy.

Category 3 Administrative Override:

Any quarter grids or other sediment areas that would have been designated as meeting Category 3 listing requirements (Figure 3) but are, wholly or in part, within the boundaries of a cleanup site, will be placed in Category 4B. In other words, there may be quarter grids that would be placed in Category 3, but because they have been administratively determined to be within the boundaries of a cleanup site they will be placed in Category 4B. This is done to transparently represent grids included in the boundaries of the site defined by the legally enforceable Pollution Control Program documents (e.g., CAP, ROD, or CM).

Category 2

A quarter grid AU will be placed in Category 2 when there are exceedances of the SQS and/or the SIZmax, as identified in the SMS (WAC 173-204-320 and 173-204-420). This generally includes grids where:

- The ChemScore = 3
- The BioScore = 1 or 2

These quarter grids will require further monitoring, investigation, or observation to determine if there is a persistent sediment quality problem and if there is an ongoing source, historic source, or a combination of both. If the sediment quality issue is determined to be partially or completely caused by an ongoing source, then further source control efforts, pollution control actions, or other regulatory actions will be required and specified on a case-by-case basis by Ecology. If the sediment quality issue is determined to be caused solely by an historic source, then further monitoring may be required to determine if action is needed.

There are no numeric standards in the SMS for freshwater or low salinity sediments that are EPA approved water quality standards. Therefore, quarter grids will be assessed using Ecology approved bioassays on a case–by-case basis. The existence of chemistry data will be noted in the comment section of any biologically based listing.

Category 2 Administrative Override:

Any quarter grids or other sediment areas that would have been designated as meeting Category 2 listing requirements but are, wholly or in part, within the boundaries of a cleanup site, will be placed in Category 4B. In other words, there may be quarter grids that would be placed in Category 2, but because they have been administratively determined to be within the boundaries of a cleanup site they will be placed in Category 4B. This is done to transparently represent grids included in the boundaries of the site defined by the legally enforceable Pollution Control Program documents (e.g., CAP, ROD, or CM).

Category 1

A quarter grid AU will be placed in Category 1 if it has been determined by Ecology to meet the benthic SQS (WAC 173-204-320).

Category 1 Administrative Override:

Any quarter grids or other sediment areas that would have been designated as meeting Category 1 listing requirements but are, wholly or in part, within the boundaries of a cleanup site, will be placed in Category 4B (Figure 3). In other words, there may be quarter grids that would be placed in Category 1, but because they have been administratively determined to be within the boundaries of a cleanup site they will be placed in Category 4B. This is done to transparently represent grids included in the boundaries of the site defined by the legally enforceable Pollution Control Program documents (e.g., CAP, ROD, or CM).

Figure 1: Chemistry Decision Flowchart

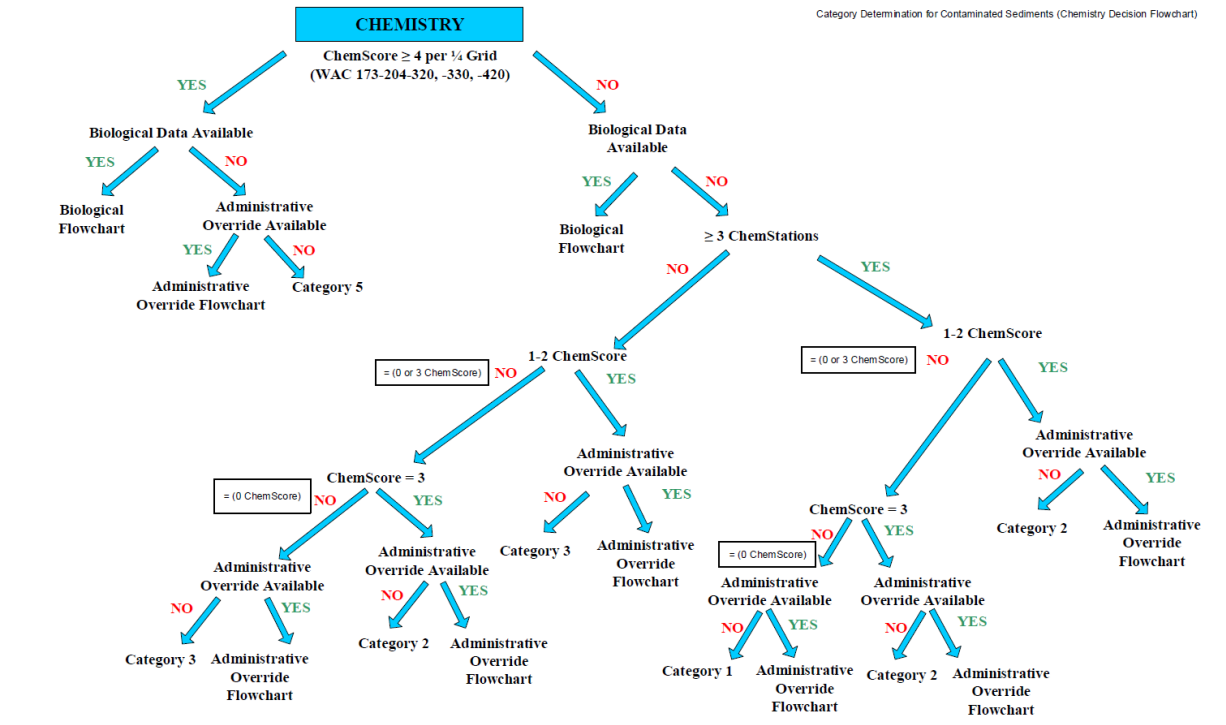


Figure 2: Bioassay Decision Flowchart

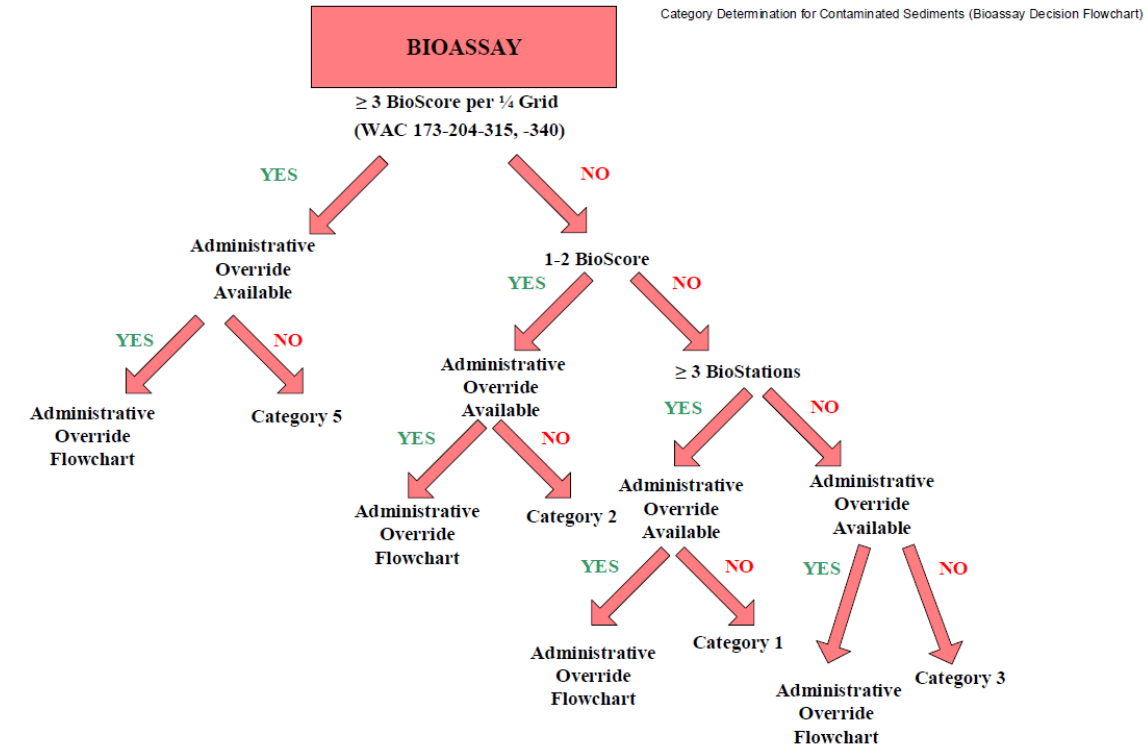
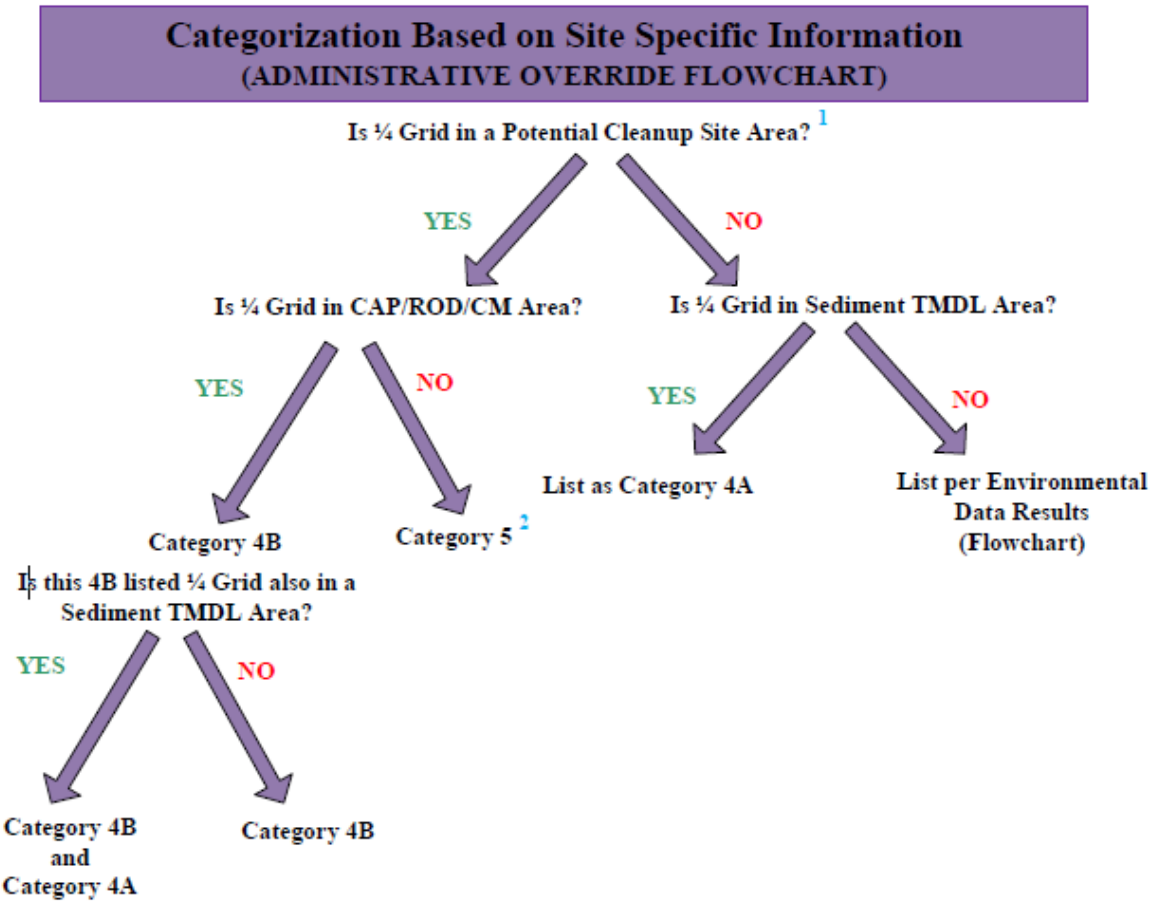


Figure 3: Administrative Override Flowchart



1. Administrative override data source is Ecology's Integrated Site Information System (ISIS) which includes information from MTCA, CERCLA, or RCRA Site Managers.

2. Administrative override data source is based upon historic data that may not be in the Environmental Information Management (EIM) System. And, technical evaluations performed by technical staff.

~~9. Prioritizing TMDLs~~ [MOVED TO PART 1H & EDITED]

~~The waterbody segments placed in Category 5 will be prioritized by Ecology's Water Quality program by engaging in an annual project scoping process that will determine the upcoming fiscal year projects, based on the following primary criteria:~~

- ~~Risk to threatened and endangered species.~~
- ~~Public health threats from toxic chemical pollution.~~
- ~~Where water quality based permit limits need to be established or lowered for municipalities' publicly owned treatment works and for industrial treatment plants.~~
- ~~Vulnerability of water bodies to degradation.~~
- ~~Risks to public health, including drinking water.~~
- ~~Severity of the pollution.~~

~~Ecology takes a watershed approach to TMDL development so that water quality impairments for multiple pollutants are addressed in a holistic fashion. New TMDL development will occur in each Ecology region based primarily on the prioritization criteria above, and also on their ability to start new projects and available resources for conducting the technical studies.~~

~~The Water Quality Program also conducts a 5-year strategic planning process (which began in 2011) to scope regional projects and outline the Water Quality Program's ability to meet the TMDL production targets that address specific numbers of category 5 listings based on the prioritization criteria listed above.~~

~~Priorities for TMDLs and cleanup activities related to sediment listings will be set by Ecology's TCP.~~

~~10. Abbreviations, Acronyms, and Definitions~~ [MOVED TO FRONT OF DOCUMENT]

~~B-IBI~~	~~Benthic Index of Biological Integrity~~
~~CAP~~	~~Cleanup Action Plan~~
~~CERCLA~~	~~Comprehensive Environmental Response Compensation and Liability Act (also known as Superfund)~~
~~CFR~~	~~Code of Federal Regulations~~
~~CSL~~	~~Cleanup Screening Level (for sediments)~~
~~CWA~~	~~Clean Water Act~~
~~DOH~~	~~Washington State Department of Health~~
~~Ecology~~	~~Washington State Department of Ecology~~
~~EIM~~	~~Environmental Information Management (Ecology database)~~
~~EPA~~	~~U.S. Environmental Protection Agency~~
~~MTCA~~	~~Model Toxic Control Act~~
~~QA/QC~~	~~Quality Assurance/Quality Control~~
~~RCW~~	~~Revised Code of Washington~~
~~RIVPACS~~	~~River Invertebrate Prediction and Classification System~~
~~ROD~~	~~Record of Decision~~
~~SMS~~	~~Sediment Management Standards~~
~~SQS~~	~~Sediment Quality Standards~~
~~TCP~~	~~Toxics Cleanup Program~~
~~TMDL~~	~~Total Maximum Daily Load~~
~~WAC~~	~~Washington Administrative Code~~

~~The following terms are defined to aid in the interpretation of the text:~~

~~7-DADMax –~~	~~Mean value of the maximum daily temperatures in a consecutive 7-day period~~
~~7-DADMin –~~	~~Mean value of the minimum daily dissolved oxygen concentrations in a consecutive 7-day period~~
~~7Q10 High Flow –~~	~~Seven-day, consecutive high flow with a ten year return frequency; the highest stream flow for seven consecutive days that would be expected to occur once in ten years~~
~~7Q10 Low Flow –~~	~~Seven-day, consecutive low flow with a ten year return frequency; the lowest stream flow for seven consecutive days that would be expected to occur once in ten years~~
~~Continuous monitoring –~~	~~Sampling regime that collects pollutant values at a defined frequency, as established in the parameter-specific sections~~
~~Exceedance –~~	~~A pollutant result value that is greater than a water quality standard criteria~~

~~Excursion –~~	~~A pollutant result value that is above or below a water quality standard criteria that has an acceptable range, (e.g. pH criteria), or a set value not to be less than, (e.g. dissolved oxygen criteria).~~
~~TMDL boundary~~	~~The area wherein a TMDL project applies and wherein implementation actions must occur to meet the goals and objectives of that TMDL~~

~~11. Approval~~ [MOVED TO FRONT OF DOCUMENT]

~~Approved:~~

~~Kelly Susewind, P.E., P.G. Date~~
~~Program Manager~~
~~Water Quality Program~~
~~Department of Ecology~~

~~Approved:~~

~~Robert Duff Date~~
~~Program Manager~~
~~Environmental Assessment Program~~
~~Department of Ecology~~

Appendix 1. Ecology's Standard Operating Procedures (SOPs) for sampling, auditing, and field methodology

Ecology has also developed a full suite of standard operating procedures (SOPs) for field sampling and field analytical activities undertaken. Ecology is in the process of publishing all SOPs and making them available on Ecology's website. If you cannot find a specific SOP on the website, please contact Ecology at 303d@ecy.wa.gov to request a copy.

Ambient Freshwater Biological and Water Quality Monitoring SOPs

- EAP011 (Publication #17-03-201) - Instantaneous Measurement of Temperature in Water
- EAP023 (Publication #17-03-202) - Collection and Analysis of Dissolved Oxygen (Winkler Method)
- EAP029 - Metals Sampling
- EAP030 - Fecal Coliform Sampling
- EAP031 - Collection and Analysis of pH Samples
- EAP032 (Publication #17-03-206) - Collection and Analysis of Conductivity Samples
- EAP034 (Publication #17-03-207) - Collection, Processing, and Analysis of Stream Samples
- EAP072 - Basic Use and Maintenance of WaterLOG ® Data Loggers and Peripheral Equipment
- EAP073 - Collecting Freshwater Benthic Macroinvertebrate Data in Wadeable Streams and Rivers
- EAP080 - Continuous Temperature Monitoring of Fresh Water Rivers and Streams

Ambient River and Stream Flow Monitoring SOPs

- EAP042 - Measuring Gage Height of Streams
- EAP055 - Operation of Teledyne Instruments Stream-Pro Acoustic Doppler Current Profiler
- EAP056 - Measuring and Calculating Stream Discharge
- EAP057 - Conducting Stream Hydrology Site Visits
- EAP058 - Operating SonTek® FlowTracker® Handheld Acoustic Doppler Velocimeter (FlowTracker)
- EAP059 - Operating Mechanical Velocity Indicators
- EAP060 - Measuring Stream Discharge from a Bridge
- EAP072 - Basic use and maintenance of Design Analysis® Data Loggers and Peripheral Equipment
- EAP082 - Correction of Continuous Stage Records Subject to Instrument Drift, Analysis of Instrument Drift, and Calculation of Potential Error

Forest Practices Effectiveness Monitoring SOPs

- EAP016 - Freshwater Drift Collection, Processing and Analysis
- EAP017 - Litterfall Collection, Processing, and Analysis
- EAP018 - Turbidity Threshold Sampling
- EAP019 - Estimating Streamflows Using a Flume

- EAP045 - Hemispherical Digital Photography Field Surveys Collected as part of a Temperature Total Maximum Daily Load (TMDL) or Forests and Fish Unit Technical Study
- EAP046 - Computer Analysis of Hemispherical Digital Images Collected as part of a Temperature Total Maximum Daily Load (TMDL) or Forests and Fish Unit Technical Study
- EAP064 - Determining Canopy Closure using a Concave Spherical Densiometer - Model C
- EAP069 - Whole Stream Metabolism Survey Using a Non-Toxic Gas and Conservative Dye Tracer
- EAP083 - Collection and Processing of Samples for Stable Isotope Analysis

Marine Monitoring SOPs

- EAP025 - Seawater Sampling
- EAP026 - Chlorophyll a Analysis
- EAP027 - Seawater Dissolved Oxygen Analysis
- EAP028 - Reagent Preparation
- EAP030 - Fecal Coliform Sampling
- EAP036 - Benthic Flux Chambers
- EAP039 - Sampling Marine Sediment
- EAP043 - Macrobenthic Sample Analysis
- EAP050 - Calibration, Preparation, and Deployment of Teledyne RD Instruments Acoustic Doppler Current Profilers (ADCPs) © (RDI)
- EAP051 - Installation, Deployment & Retrieval of Oceanographic Sensors and Safety at Marine Mooring Stations
- EAP086 - Marine Waters Oxygen and Supporting Sensor Performance Assessment – Lab Procedures
- EAP087 - Marine Waters Oxygen and Supporting Sensor Performance Assessment – Field Procedures
- EAP088 - Marine Waters Data Quality Assurance and Quality Control
- EAP092 - BEACH Program Bacteria Sampling
- EAP104 - Installation, Deployment, and Maintenance of Sensors Onboard theVictoria Clipper IV Ferry Vessel

Total Maximum Daily Load (TMDL) Studies SOPs

- EAP015 - Manually Obtaining Surface Water Samples
- EAP023 (Publication #17-03-202) - Collection and Analysis of Dissolved Oxygen (Winkler Method)
- EAP024 - Measuring Streamflow for Water Quality Studies
- EAP030 - Fecal Coliform Sampling
- EAP032 (Publication #17-03-206) - Collection and Analysis of Conductivity Samples
- EAP033 - Hydrolab®, DataSonde®, and MiniSonde® Multiprobes
- EAP036 (Publication #17-03-203) - Benthic Flux Chambers
- EAP037 - Time of Travel Studies in Freshwater using a Dye Tracer

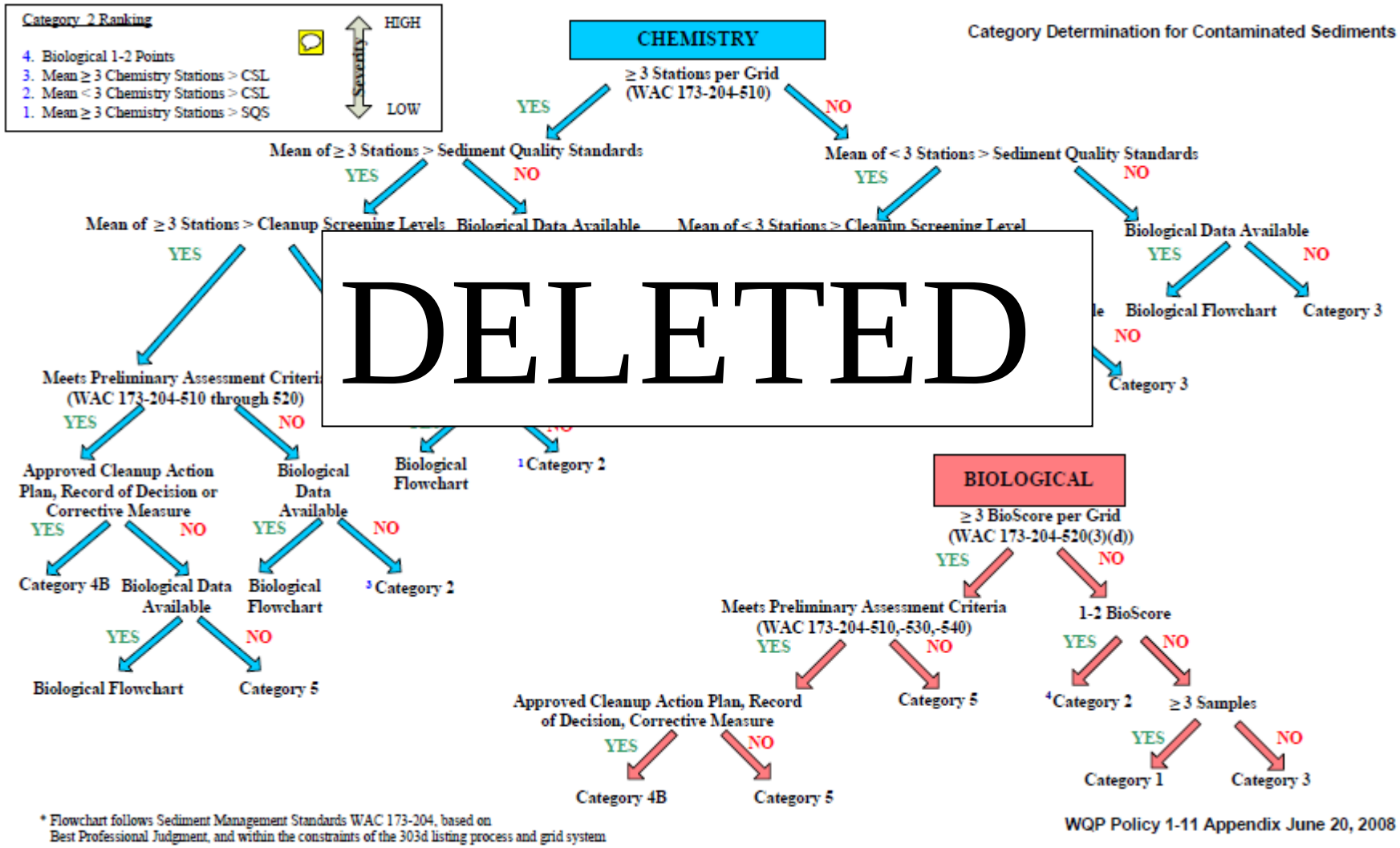
- EAP044 - Continuous Temperature Monitoring of Fresh Water Rivers and Streams Conducted in a TMDL Study
- EAP045 - Hemispherical Digital Photography Field Surveys Collected as part of a Temperature TMDL or Forests and Fish Unit Technical Study
- EAP046 - Computer Analysis of Hemispherical Digital Images Collected as part of a Temperature TMDL or Forests and Fish Unit Technical Study
- EAP075 - Measuring Vertically Averaged Salinity in Brackish Waters
- EAP084 - Conducting Riparian Vegetation and Stream Channel Surveys in Wadeable Streams for Temperature TMDL Studies
- EAP085 - Collecting Periphyton Samples for TMDL Studies
- EAP091 - Turner Designs Cyclops-7 Submersible Optical Brightener Sensors and Precision Measurement Engineering, Inc. Cyclops-7 Loggers
- EAP097 - Collection of Longitudinal Stream Depth Profiles

Toxics Monitoring SOPs

- EAP001 - Conducting Studies Using Semi-Permeable Membrane Devices (SPMD)s
- EAP003 - Sampling Pesticides in Surface Waters
- EAP007 - Resecting Finfish Whole Body, Body Parts or Tissue Samples
- EAP008 - Resecting DNA Samples and Aging for Finfish
- EAP009 - Collection, Processing and Preservation of Finfish Samples
- EAP038 - Collection of Freshwater Sediment Core Samples Using a Box or KB Corer
- EAP040 - Freshwater Sediment Sampling
- EAP041 - Collecting Freshwater Suspended Particulate Matter Samples Using In-Line Filtration
- EAP079 - Semi-Permeable Membrane Devices (SPMD)s Data Management and Data Reduction
- EAP090 - Decontaminating Field Equipment for Sampling Toxics in the Environment

Watershed Health Monitoring SOPs

- EAP095 - Collecting Water Samples for Watershed Health Monitoring


Category 2 Ranking
4. Biological 1-2 Points
3. Mean ≥ 3 Chemistry Stations > CSL
2. Mean < 3 Chemistry Stations > CSL
1. Mean ≥ 3 Chemistry Stations > SQS
Severity
HIGH
LOW
CHEMISTRY
Category Determination for Contaminated Sediments
≥ 3 Stations per Grid (WAC 173-204-510)
YES
NO
Mean of ≥ 3 Stations > Sediment Quality Standards
Mean of < 3 Stations > Sediment Quality Standards
Mean of ≥ 3 Stations > Cleanup Screening Levels
Biological Data Available
Mean of < 3 Stations > Cleanup Screening Level
Biological Flowchart
Category 3
Meets Preliminary Assessment Criteria (WAC 173-204-510 through 520)
Approved Cleanup Action Plan, Record of Decision or Corrective Measure
Biological Data Available
Biological Flowchart
[1] Category 2
Category 4B
[3] Category 2
Category 5
BIOLOGICAL
≥ 3 BioScore per Grid (WAC 173-204-520(3)(d))
Meets Preliminary Assessment Criteria (WAC 173-204-510,-530,-540)
1-2 BioScore
[4] Category 2
≥ 3 Samples
Approved Cleanup Action Plan, Record of Decision, Corrective Measure
Category 1
Category 4B
Category 5
* Flowchart follows Sediment Management Standards WAC 173-204, based on Best Professional Judgment, and within the constraints of the 303d listing process and grid system
WQP Policy 1-11 Appendix June 20, 2008

DELETED