CONSOLIDATED ASSESSMENT AND LISTING METHODOLOGY

For

OREGON'S 2002 303(d) LIST of WATER QUALITY LIMITED WATERBODIES

And

INTEGRATED 305(b) REPORT

Oregon Department of Environmental Quality

January 2003

BACKGROUND:

Section 305(b) of the Clean Water Act (CWA) requires states to report on the extent to which all navigable waters meet water quality standards. All surface waters, including rivers, streams, lakes, ponds, reservoirs, wetlands, estuaries and coastal waters are considered "navigable" under the CWA.

Section 303(d) of the CWA requires each state to identify those waters for which existing required pollution controls are not stringent enough to achieve that State's water quality standards. These water bodies are considered "water quality limited" or "impaired." Once a water body is identified as being water quality limited, Section 303(d) requires that Total Maximum Daily Loads (TMDLs) be developed. TMDLs describe the amount of each pollutant a water body can receive and not violate water quality standards. EPA regulations require states to submit, along with the 303(d) list, a description of the methodology used to identify and prioritize waters for TMDL development.

Submissions of both water quality assessments are due to EPA every two years. Prior to 2002, States submitted the 303(d) list and the 305(b) report as separate documents. In the "2002 Integrated Water Quality Monitoring and Assessment Report Guidance" EPA recommends that States submit an integrated report that will satisfy Clean Water Act requirements for both Section 305(b) water quality reports and Section 303(d) lists of water quality limited water bodies. In the "integrated report" water bodies can fall into one of several categories depending on available data, water quality status and source of impairment.

ASSESSMENT METHODOLOGY

This document summarizes the assessment methodology used by the Oregon Department of Environmental Quality (ODEQ) to determine water quality standards attainment for both the 2002 305(b) water quality report and the 2002 303(d) list of impaired waters. The assessment methodology is based on the following documents:

- "2002 Integrated Water Quality Monitoring and Assessment Report Guidance", EPA, November 2001
- "Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Report Contents", EPA, 1997
- Oregon's Water Quality Standards
- "Consolidated Assessment and Listing Methodology" EPA, DRAFT April 20, 2001
- Oregon Department of Environmental Quality's Listing Criteria for the 1998 303(d) list
- Water Quality Monitoring, Technical Guide Book", the Oregon Plan for Salmon and Watersheds, July 1999.
- June 22, 1998 letter from ODEQ to EPA, Region X, providing policy clarifications for Oregon's water quality standards interpretation.

States must consider all existing and readily available data and information to prepare the Section 303(d) list. When the data and information meet reasonable and appropriate data quality requirements described in the State's assessment methodology, it must be used in the assessment. (Consolidated Assessment and Listing Methodology, Toward a Compendium of Best Practices, DRAFT April 20, 2001, EPA).

This document is divided into several parts:

1. Water quality standards discussion
2. Data evaluation process discussion including:
   - Metadata requirements
   - QA/QC requirements
   - Minimum number of samples
3. Integrated Report Categories
4. General policy issue discussion:
   - De-listing
   - Drought conditions
   - Segmentation
   - Narrative Biological Criterion
   - Tribal Waters
   - Schedule

5. Parameter Specific discussion including:
   - Decision trees to interpret dissolved oxygen, temperature and bacteria criteria
6. Integrated report format

Water Quality Standards:

The objective of the Clean Water Act (CWA) is to restore and maintain the physical, chemical and biological integrity of the Nation's waters (CWA 101(a)). To help implement these objectives, states develop and adopt water quality standards. Water quality standards include beneficial uses, narrative and numeric criteria and anti-degradation policies.

Oregon's water quality standards are contained in Oregon's Administrative Rules (OAR) 340 Division 41. Beneficial uses are listed in OAR 340 Division 41 by Oregon Water Resource Division basin. Examples of beneficial uses are shown in Table 1, the basin use table for the North Coast-Lower Columbia Basin (OAR 340-41-202).

Table 1: North Coast -Lower Columbia Basin Beneficial Uses

Beneficial Uses	Estuaries and Adjacent Marine Waters	Columbia River Mouth to RM 86	All other Streams and Tributaries Thereto
Public Domestic Water Supply[1]		X	X
Private Domestic Water Supply[1]		X	X
Industrial Water Supply	X	X	X
Irrigation		X	X
Livestock Watering		X	X
Anadromous Fish Passage	X	X	X
Salmonid Fish Rearing	X	X	X
Salmonid Fish Spawning	X	X	X
Resident Fish and Aquatic Life	X	X	X
Wildlife and Hunting	X	X	X
Fishing	X	X	X
Boating	X	X	X
Water Contact Recreation	X	X	X
Aesthetic Quality	X	X	X
Hydro Power			
Commercial Navigation & Transportation	X	X	
[1]With adequate pretreatment (filtration and disinfection) and natural quality to meet drinking water standards.			

Standards are designed to protect the most sensitive beneficial use within a water body. Listings can be based on: evidence of a numeric criteria exceedence; evidence of a narrative criteria exceedence; evidence of a beneficial use impairment; or anti-degradation (i.e. a declining trend in water quality such that it would exceed a standard prior to the next listing period).

Data Evaluation Process:

As part of the 2002 data evaluation process, ODEQ requested data from outside the agency. The public notice included a description of the minimum data requirements for data to be evaluated for the "integrated report" (Appendix A).

EPA recommends several steps be part of the data evaluation process (EPA, CALM, DRAFT April 2001). Each of these steps is discussed separately below:

Metadata requirements:

Determine if metadata accompanying the data set meets your agency's requirements; (e.g. determine adequacy and accuracy of geographic documentation in the data set). (EPA, CALM, DRAFT April 2001).

ODEQ uses a river reach system called "LLID". Latitude-longitude identifiers (LLIDs) are a system of unique identifiers for streams in the State. The identifier consists of the latitude/longitude at the mouth of the stream. Only one LLID exists for a stream. Some water bodies on the 2002 303(d) list do not have a LLID and do not appear on the map created using the streamnet system. Where water bodies did not have a LLID, a "placeholder" LLID was created so that records may be retained in the database. Because these water bodies do not appear on the LLID map, there is no length assigned to them. Unless otherwise stated, the listing applies from the mouth to the headwaters. More information about the LLID system can be found at

http://www.streamnet.org/pnwr/PNWNAR.html

ODEQ required geographic information in the form of latitude/longitude, preferably recorded as decimal degrees, to be submitted with each sample. The source of the latitude/longitude was also requested (i.e. GPS; USGS Topo Map, 1:100,000 or 1:24,000 (include map scale); or specify other method). Site descriptions were also required.

The latitude and longitude and site description were used to determine the LLID and river mile for each site. The sampling stations were then placed on a map of the State's water bodies (reaches at 1:100,000) scale

Quality Assurance/Quality Control (QA/QC)

Screen documentation to determine if appropriate procedures were used and QA/QC measures were in place. (EPA, CALM, DRAFT April 2001).

The following description of QA/QC is taken from the Water Quality Monitoring Technical Guide Book, The Oregon Plan for Salmon and Watersheds, July 1999.

Quality Assurance (QA) is defined as: The overall management system of a project including the organization, planning, data collection, quality control, documentation, evaluation and reporting activities. QA provides the information needed to determine the data's quality and whether it meets the project's requirements.

Quality Control (QC) is defined as the routine technical activities intended primarily to control errors. Since errors can occur in either the field, the laboratory, or in the office, QC must be a part of each of these activities.

As part of QA/QC planning, data quality objectives need to be defined. These relate to the precision, accuracy, representation, completeness and comparability of the data.

For the 2002 integrated report, ODEQ evaluated data quality differently depending on the parameter.

"Conventional" (i.e. E coli, pH, temperature, dissolved oxygen) data submitted to ODEQ was evaluated for precision and accuracy. Each of these terms is defined below.

Precision: Precision refers to the amount of agreement among repeated measurements of the same parameter. To determine precision, duplicate samples must be collected at a number of sample sites (Oregon Plan). For grab data to be used for the 2002 "integrated report", duplicate samples were to be collected at 10% of the total number of monitoring sites (1 duplicate for every 10 sites).

Accuracy: Accuracy measures how close the results are to a true or expected value. This is normally determined by measuring a standard or reference sample of a known amount and comparing how far the results at the monitoring site are from the reference value (Oregon Plan).

For the 2002 "integrated report" QA/QC accuracy was determined by the equipment used (manufacturer and model) and the accuracy values recorded by the manufacturer. Pre and post deployment checks or a minimum of two field audits determined the accuracy of continuous temperature data.

Grab data (a sample collected at one point in time) for conventional parameters was assigned a "Data Quality Level" according to Table 2. The data quality level (DQL) depends on a combination of quality control and method selection. The DQLs were developed by DEQ staff based on:

- The accuracy of the instrumentation as defined by the manufacturer
- The accuracy of the instrumentation/method based on experience of ODEQ laboratory staff
- Data analysis by ODEQ staff (see E Coli discussion)

E Coli precision calculations:
To determine the acceptable precision for E Coli data ODEQ used a method recommended by EPA. In this analysis, 228 paired samples were evaluated (Larry Caton, ODEQ, personal communication, June 12, 2002).

1) The difference in the results for the duplicates was calculated.
2) The average difference of the samples was calculated
3) The average difference was multiplied by 2.456 to determine the 95% confidence limit for the dataset (confidence limit from: Youden, W.J. and Steiner, E.H., Statistical Manual of the Association of Official Analytical Chemists, Washington D.C., Association of Official Analytical Chemists, 1975).
4) Based on this method, the precision for E coli was calculated to be 0.5 log.

Level C data is data which fails QA/QC review. Data that falls into this category includes data in which the duplicate samples were not within the range of precision stated in **Table 2: 303(d) and 305(b) Data Quality Level for Grab Data.** pH data is graded as Level C data if a gel electrode is used.

Level E data is data in which no duplicates or field checks were obtained for the parameter of interest. Level E data is data of "unknown" quality. Level C and Level E data **ARE NOT** used in the 2002 303(d) list or the 305(b) report.

Table 2: 303(d) and 305(b) Data Quality Level for Grab Data

Data Quality Level	Temperature Methods	pH Methods	Dissolved Oxygen Methods	Turbidity	Conductivity	E. coli bacteria Methods	Nitrate	Data Uses
A	Thermometer Accuracy checked with NIST standard. A= +/- 0.5°C P= +/-1.0°C	Calibrated pH electrode (no gel electrodes) A= +/-0.2 pH unit P= +/-0.3 pH unit	Winkler titration or oxygen meter calibrated to a Winkler Titration A= +/-0.3 mg/L P= +/-0.5 mg/L	Nephlometric Turbidity Meter A = +/- 5 % of standard value If turbidity <20 NTU: P= +/- 2 NTUs If Turbidity > 20 NTU: P= +/- 5%	Meter Temperature correction to 25°C. A= +/- 7% of standard value P = +/- 2%	ODEQ Approved methods Duplicate sample P = +/- 0.5 log	Concentrations >0.025 mg/L: P = +/-10% Concentrations < 0.025 mg/L: P = +/-0.01 mg/L.	Used for 303(d) and 305(b) assessment
B	Thermometer Accuracy checked with NIST standard. A= +/-2.0°C P= +/-1.0°C	Any method with: A= +/-0.5 pH unit P= +/-0.5 pH unit (no gel electrodes)	Winkler titration or oxygen meter calibrated to a Winkler Titration A= +/-1 mg/L P= +/-1 mg/L	Any method with A = +/- 30% P= +/- 30%	Meter Temperature correction to 25°C A= +/-10% P= +/- 5%	ODEQ Approved methods Analysis done by a commercial lab	Concentrations >0.025 mg/L: P = +/-10% Concentrations < 0.025 mg/L: P = +/-0.01 mg/L.	Used for 303(d) and 305(b) assessment
C	A = >2.0°C	Any other method +/- 1 pH unit Data collected with gel electrodes	Any other method +/- 1 mg/L	Any other method with P > 30%	Meter without regular accuracy checks	Duplicate samples P>0.5 log	No precision checks (field duplicates)	Not used for 303(d) or 305(b) assessment and data is voided from DEQ database (failed QA/QC)
E	No precision	No	No precision checks	No precision	No precision checks	No precision checks	No precision checks	Education- not

	checks	precision checks		checks or Observations, clear, muddy, etc				used for 303(d) or 305(b) assessment

Continuous temperature data was graded using both pre- and post -deployment checks and field audits. For data to be DQL "A", pre and post deployment checks and a minimum of two field audits had to be included with the data files. Specific examples are outlined below.

Table 3: 303(d) and 305(b) Data Quality Level for Continuous Temperature Data[1]

Data Quality Level (DQL)	Pre- and Post- Deployment Accuracy Checks	Field Audit Accuracy Checks
A	Difference between NIST thermometer and logger < 0.50°C	Difference between NIST thermometer and logger < 1.5°C
B	Difference between NIST thermometer and logger > 0.50°C and < 1.0°C	Difference between NIST thermometer and logger > 1.5°C and < 2.0°C
C	Difference between NIST thermometer and logger > 1.0°C	Difference between NIST thermometer and logger > 2.0°C
E	No pre or post deployment accuracy checks were conducted	No field audits were conducted

For data to be DQL A both pre-and post-deployment checks and two field audits (at the beginning and end of the logger deployment period) must have been conducted and the accuracy must be at the "A" level.

If no pre- and post- deployment accuracy checks were conducted, but the beginning and ending field audits are either level "A" or "B", the data is level "B". Alternatively, if pre- and post- deployment accuracy checks were conducted and were at least level "B", but no field audits were conducted the data is level "B".

Data that fails any of the accuracy checks is graded as level "C" and is not used for 2002 303(d) or 305(b) evaluation.

Data accompanied by no accuracy checks is graded as level "E" and is not used for 2002 303(d) or 305(b) evaluation.

Data accompanied by one field audit, with no pre- and post-deployment accuracy checks is also level "E" data and not used for 2002 303(d) or 305(b) evaluation.

[1] All continuous temperature data was processed using Hydrostat Version 10.

Figure 1: Continuous Temperature Data Grading for Analyses with Pre- and Post- Deployment Accuracy Checks and a Minimum of 2 Field Audits:

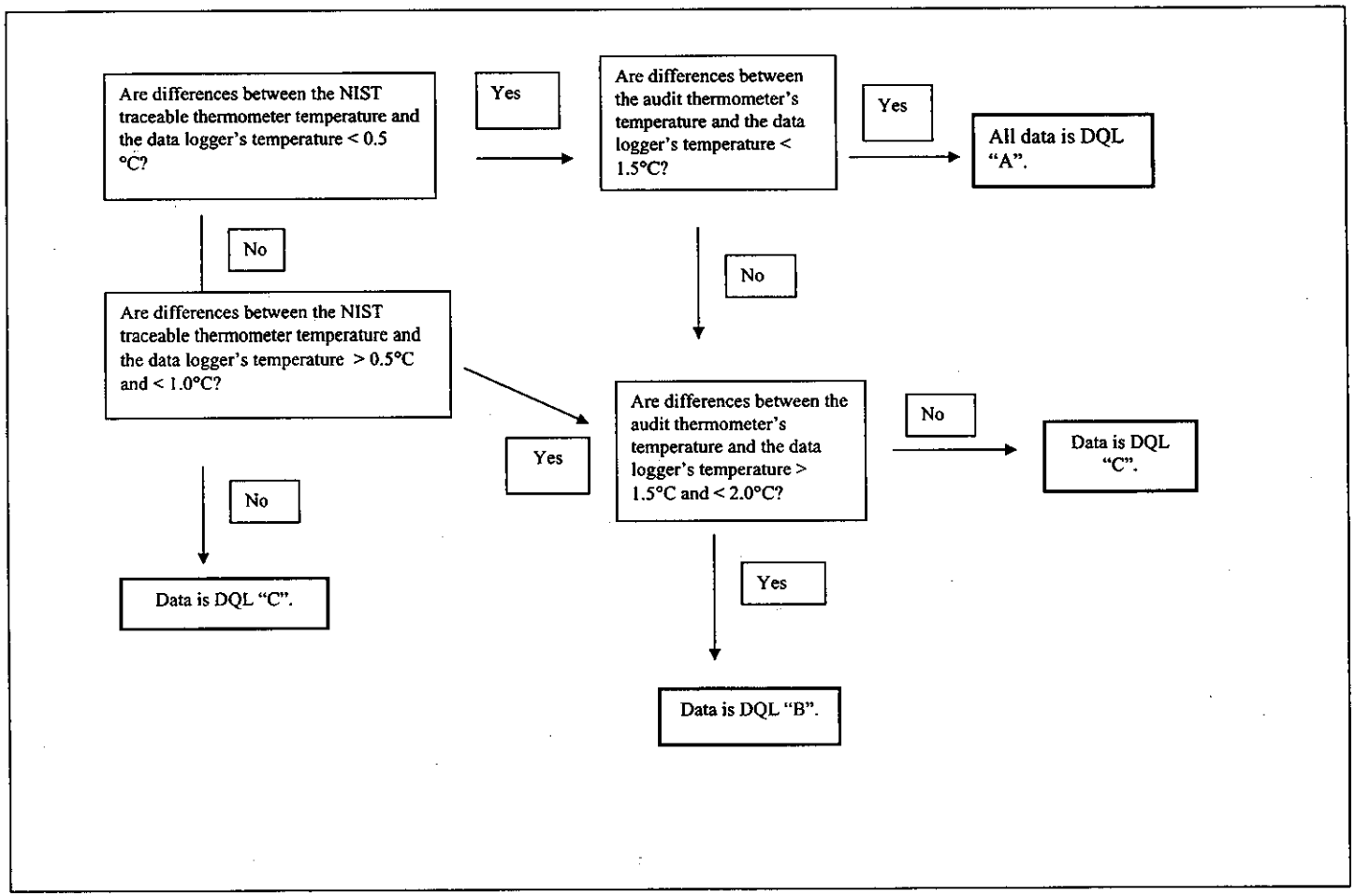
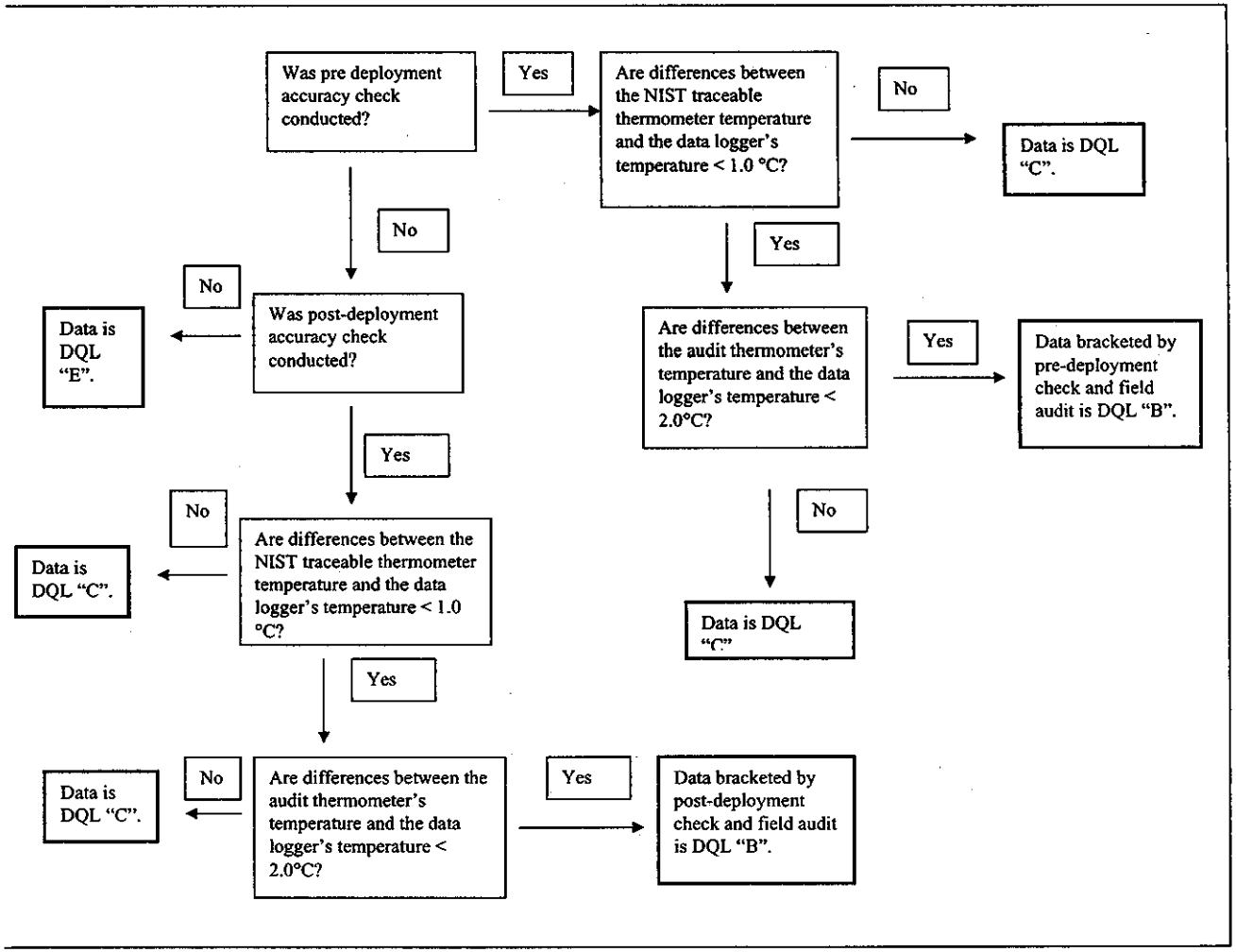


Figure 2: Continuous Temperature Data Grading for Analyses with Pre- or Post- Deployment Accuracy Checks and One (1) Field Audit:



Data quality for "toxics" (i.e. parameters included in Table 20) was not determined by evaluation of precision and accuracy. ODEQ required documentation of the analysis method. QA/QC plans had to be available for ODEQ review, but were not required with the data submittal. When possible, ODEQ compared data collected by third parties to data collected by ODEQ.

- *Review sample collection and analytical methods to determine compatibility with your agency's QA/QC requirements and SOPs; also determine if the third party's sample collection and analytical methods were actually followed in the creation of the data set. .* (EPA, CALM, DRAFT April 2001).

The method of analysis was to be documented in either the sample project's Quality Assurance Project Plan or in the data submittal form.

- *Determine if samples were collected under the appropriate conditions for comparison to water quality standards (e.g. correct time of year or flow conditions).* (EPA, CALM, DRAFT April 2001).

Applicable spawning times were documented in a policy memo submitted by ODEQ to EPA, Region 10 on June 22, 1998. Table 4, modified from the memo, summarizes the default spawning time periods and locations.

Oregon Department of Fish and Wildlife (ODFW) have anadromous fish distribution maps (Version 9) for several species including: coho, coastal cutthroat, summer and winter steelhead, fall and spring chinook and chum. These maps were used to determine the spawning locations for these species. The maps are available at: http://osu.orst.edu/dept/nrimp/24k/index.htm

Distribution maps are not available for resident species such as redband and rainbow trout (Martin Hill, ODFW, personal communication, March 2002). ODEQ staff consulted with ODFW district biologists to determine whether resident spawning occurred in specific water bodies, as requested during the public comment period on the draft 2002 303(d) list.

The default time periods and locations have been refined for the Hood River Basin, the Imnaha River Basin, the Middle Fork John Day River Basin and the North Fork John Day River basin. Additional documentation can be found at: http://www.deq.state.or.us/wq/standards/WQStdsBeneficialUses.htm

ODEQ used the locations described in "Status of Oregon's Bull Trout, Distribution, Life History, Limiting Factors, Management Considerations, and Status", ODFW, October 1997, to determine bull trout distribution. As explained in the June 22, 1998 policy memo, ODEQ is applying the bull trout temperature criterion to those areas delineated as supporting spawning, rearing or resident adult bull trout (since 1990) in the document.

Table 4: Salmonid Spawning

Basin	Salmonids Present within Basin	Spawning-Fry Emergence	Comments
North Coast	CO, CHF,CHS,CS,CT,STW	September 15-May 31	
Mid Coast	CO, CHF, CHS, CS, CT, STS, STW	September 15-May 31	
South Coast	CO, CHF, CHS, CT, STW	October 1- May 15	
Umpqua	CO, CHF, CHS, CT, STS, STW	September 15-May 31	No spawning occurs in Umpqua River estuary to Head of Tidewater and adjacent marine waters (OAR 340-41-282, Table 3)
Rogue	BT, CO, CHF, CHS, CT, STS, STW	October 1 – May 31	No spawning occurs in Rogue River estuary and adjacent marine waters (OAR 340-41-442, Table 5)
Willamette-other ecoregions	BUT, CHF, CHS, CT, RB, STW	October 1 – May 31	
Willamette-Willamette Valley Ecoregion, most typical	CHF, CHS, CT, RB, STW	October 1 – May 31	No spawning in the Willamette River from the mouth to Newberg, including Multnomah Channel (OAR 340-410442, Table 6); spawning may not occur naturally in many of these streams.
Willamette-Clackamas, Santiam (including N & S Fork), McKenzie, Molalla and Mid Fork Mainstems	BUT, CHF, CHS, CT, RB, STW	September 15- June 30	
Sandy	CHF, CHS	September 15- June 30	
Hood-Hood River Drainage	CHF, CHS, CO, STS, STW	September 15- June 30	
Hood – Miles Creek Drainage	STW, RB	October 1 – June 30	
Deschutes River and East Side Tributaries	BR, BT, BUT,CHF, K, RB, RT, STS	October 1 –June 30	
Deschutes River and West Side Tributaries	BR, BT, BUT,CHF, K, RB, RT, STS	September 1 – June 30	
John Day	BUT, CHS, CT, RT, STS	October 1 –June 30	Spawning is typically in upper portions of the basin
Umatilla/Walla Walla	BUT, CHF, CHS, CO, RT, STS	October 1 –June 30	Spawning is typically in upper portions of the basin
Grande Ronde	BUT, CHF, CHS, RB, RT, STS	October 1 –June 30	Spawning is typically in upper portions of the basin
Powder	BUT, RB, RT	March 1- June 30	Spawning is typically in upper portions of the basin

Malheur River	BUT, RB, RT	March 1- June 30	No spawning occurs in the Malheur River (Namorf to mouth), Willow Creek (Brogan to mouth), Bully Creek, (reservoir to mouth), and in the following reservoirs; Malheur, Bully Creek, Beulah and Warm Springs (OAR 340-41-802, Table 15); spawning in upper basin
Owyhee	RB, RT, LCT	March 1- June 30	No spawning occurs in the Owyhee River (RM 0-18) and in the following reservoirs: Antelope, Cow Creek, Owyhee (OAR 340-41-842, Table 16); spawning is typically in the upper portions of the basin
Malheur Lake	RB, RT, LCT	March 1- June 30	No spawning occurs in the natural lakes in the basin (OAR 340-41-882, Table 17); spawning is typically in the upper portions of the basin
Goose and Summer Lakes	BT, RT	March 1- June 30	No spawning occurs in Goose Lake and other highly alkaline and saline lakes (OAR 340-41-922, Table 18); spawning is typically in upper portions of the basin
Klamath	BT, RB, RT	March 1- June 30	Spawning occurs where natural conditions are suitable for salmonid fish use and no spawning occurs in the Klamath River from Klamath Lake to Keno Dam (RM 255 to 232.5), Lost River (RM 5 to 65) and Lost River Diversion Channel (OAR 340-41-962, Table 19)
Columbia River	CHF, CHS, CHR, CO, CS, CT, SS, STS, STW	October 1 – May 31	No spawning occurs in portions of the Columbia River (OAR 340-41-482, Table 7; OAR 340-41-522, Table 8 and OAR 340-41-562, Table 9)
Snake River	CHF, CHS, SS, STS	October 1 – June 30	

Fish Species Coding:
BT= brook trout; BUT= bull trout; CH(X) = chinook salmon (F= fall, R=summer, S= spring); CO= coho salmon; CS= chum salmon; CT = cutthroat salmon; K = Kokanee; LCT = Lahontan cutthroat trout; RB = rainbow trout; RT = redband trout; SS =sockeye salmon; ST(X) = steelhead (S=summer, W = winter)

Minimum sample number:

Datasets were screened to determine if the minimum number of samples were available. The sample minimum is the same as that used in previous ODEQ 303(d) lists. Generally, at least 5 samples per parameter were required. Datasets that had less than 5 samples were labeled with the "insufficient data" category. If no data was submitted, by default the waterbody is placed in the "insufficient data" category. For datasets with at least 5 samples, 10% of the samples (with a minimum of two exceedances) had to exceed the applicable criterion for the water body to be considered water quality limited.

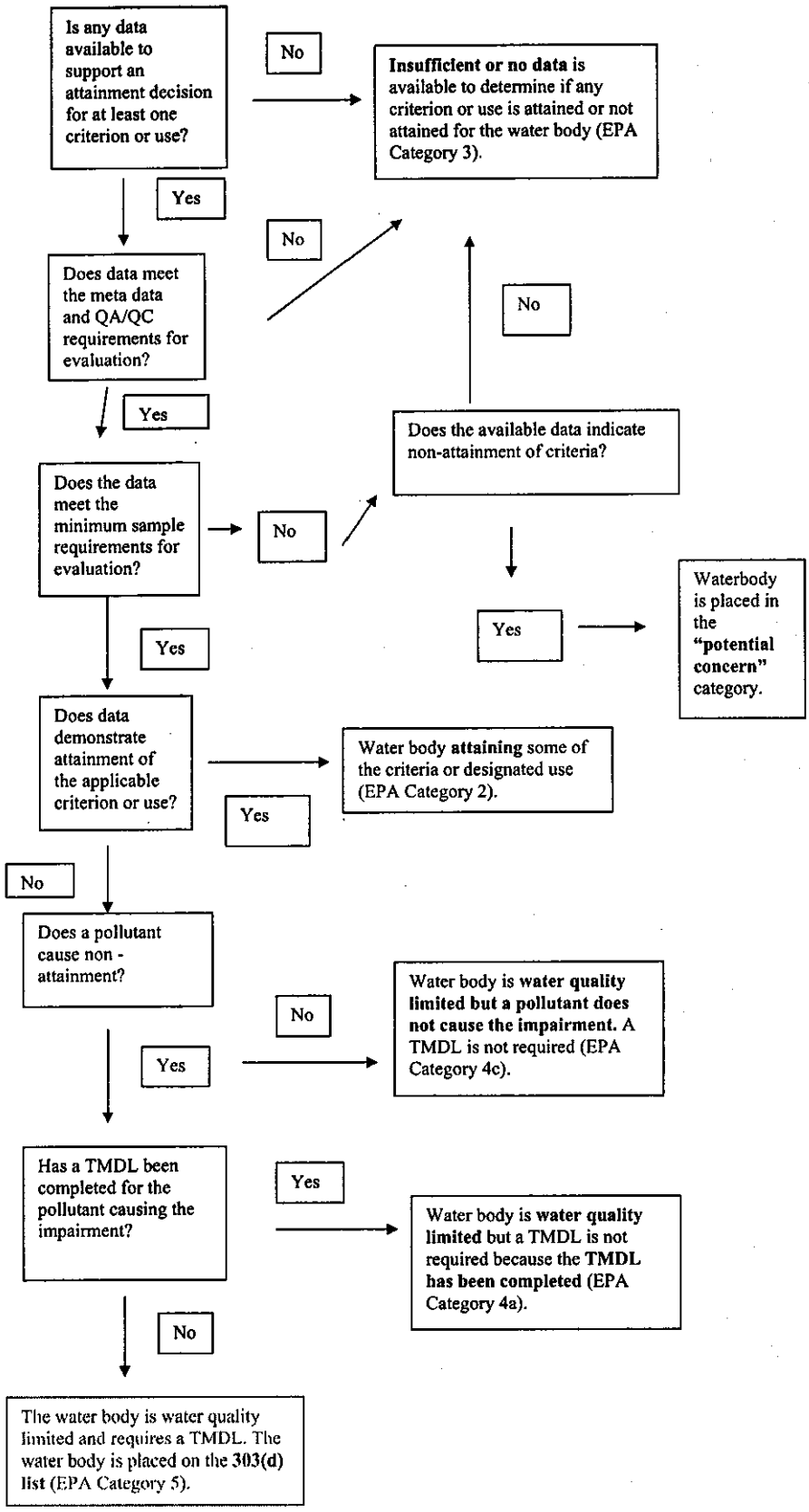
For water bodies to be placed in the "attaining criteria" category at least 5 samples per parameter were required and at least 90% of the samples in the dataset had to be in compliance with the applicable criterion.

Most of the data used in the 2002 integrated report has been stored in LASAR (Laboratory Analytical Storage and Retrieval), the database where DEQ stores data. The LASAR ID is a five digit code assigned to a sampling location based on the latitude/longitude and site description. Because the LASAR ID is based on the sampling location, it is possible for a LASAR ID to be assigned to more than one organization.

Integrated Report Categories:

The following flow chart (Figure 3) summarizes the assessment process. This flow chart approximates "Diagram 1" in EPA's "integrated report" guidance (EPA, November 2001).

Figure 3: Integrated Report Categories



General Policy Discussion:

DE-LISTING WATERBODIES:

Water bodies placed on previous 303(d) lists remain on the 2002 303(d) list unless they are de-listed. Water bodies may be removed from the 303(d) list for several reasons, each of which is presented below.

1. A water body may be moved to "attaining" (EPA category 2) if new information showing that water quality standards are being met is submitted. Data submitted for de-listing consideration was evaluated if it met a Data Quality Level of A or B and met the minimum sample requirements. Generally, it took similar data to de-list a water body as it took to place the water body on the 303(d) list. For example, if the listing was based on two successive years of a standard not being met, the Department would look for at least two successive years of data indicating that the standard is being met.
2. Data was submitted that identified a flaw in the original assessment. For example, a water body may have been placed on a previous 303(d) list based on data not collected following QA/QC requirements. If more recently collected data following the QA/QC requirements indicates compliance with the applicable criterion, the water body will be de-listed.

There are situations in which a water body may be water quality limited but does not have to be included on the 303(d) list.

1. The segment has a TMDL approved by EPA. Segments that have TMDLs established will be removed from the 303(d) list, but will retain their Water Quality Limited status (per OAR 340-41-006(30)) until they meet water quality standards. For the 2002 "integrated report" generally only those waters that were previously on the "303(d)" list were moved to the "TMDL Approved" category. Often TMDLs are developed on a watershed scale. All water bodies within these watersheds would be addressed by the TMDL and can be moved to the "TMDL Approved" category. These water bodies will be re-categorized in the 2004 "integrated report".
2. A pollutant does not cause the water body impairment. EPA defines a pollutant according to Section 502(6) of the Clean Water Act. ODEQ previously placed water bodies on the 303(d) list based on habitat modification and flow modification. Habitat modification listings were based on information indicating inadequate pool frequency and lack of large woody debris. Flow modification listings were based on inadequate flow to maintain instream water rights (IWR) purchased by Oregon Department of Fish and Wildlife. Because flow and habitat are not considered pollutants under the Clean Water Act, these water bodies were removed from the 303(d) list, and placed in the category "water quality limited but a pollutant does not cause the impairment".

DROUGHT CONDITIONS:

In previous 303(d) lists, drought years were determined based on declarations of a drought emergency in the Governor's office. Drought emergencies were declared in 1991, 1992 and in 1994 for selected counties. If a Drought Emergency declaration was made for a given year, drought conditions were assumed to apply to the entire state.

For the 2002 303(d) list, a drought year was determined based on the "Drought Monitor". The drought monitor is produced under a partnership consisting of the U.S. Department of Agriculture (Joint Agricultural Weather Facility and National Water and Climate Center), the National Weather Service's Climate Prediction Center, and the National Drought Mitigation Center at the University of Nebraska Lincoln. More information on the Drought Monitor can be found at http://enso.unl.edu/monitor/monitor.html.

The drought monitor synthesizes multiple indices that represent a consensus of federal and academic scientists. The indices include:

1. **Palmer Drought Index** - a soil moisture algorithm calibrated for relatively homogenous regions.
2. **Standardized Precipitation Index** - an index based on the probability of precipitation for any time scale.
3. **Percent of Normal Precipitation** - calculated by dividing actual precipitation by normal precipitation, which is typically considered to be a 30-year mean, and multiplying by 100%.
4. **CPC soil moisture models**

5. **USGS weekly streamflows** - real-time streamflow compared to **percentiles** of 30 years of historical daily streamflow for the day of the year.
6. **Satellite vegetation health index** -vegetation condition (health) estimated by the Vegetation and Temperature Condition Index (VT). The VT is a numerical index, which changes from 0 to 100 characterizing change in vegetation conditions from extremely poor (0) to excellent (100).

According to the archives of the drought monitor all of Oregon was in a moderate drought by March 20, 2001. (http://enso.unl.edu/monitor/archive/2001/drmon0320.htm) For the 2002 303(d) list, 2001 is considered a drought year.

Where multiple years of data were available, if the only data showing an exceedence of the criteria were data collected during a drought year, the segment was not put on the 303(d) list but identified as "attaining criteria/uses". If only one year of data was available for a stream and this data was collected during a drought year, the stream was identified as "potential concern" until it can be shown that the water does not meet standards in non-drought years.

SEGMENTATION:

Waterbody segment length was determined by a succession of steps:

- The segment lengths used for previous 303(d) lists were used as a starting point.
- If data indicated that segment lengths should be changed (i.e. data was submitted that showed that a portion of a previously listed segment was attaining the criterion), the new segment ended at the point of a confluence nearest the new sampling point.
- For a waterbody not previously evaluated, the waterbody segments were delineated by 5th field watershed boundaries.
- If the waterbody was contained within a 5th field watershed, and only one site was sampled, the entire length was categorized by the results of the one site.

The segment length can be changed in following 303(d) lists if data is submitted which indicates attainment of the criterion in a portion of the listed segment.

NARRATIVE BIOLOGICAL CRITERION:

The narrative biological criterion is described in OAR 340-41-027:

> Standards applicable to all basins:
> Waters of the state shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

In previous 303(d) lists, ODEQ evaluated biological data using multimetric scores and multivariate models. A water body was determined to be water quality limited by the following evaluation (ODEQ 1998 303(d) Listing Criteria):

> Aquatic communities (primarily macroinvertebrates) which are 60% or less of the expected reference community **for both** multimetric scores and multivariate model scores are considered impaired.

ODEQ is in the process of developing numeric biological criteria and is currently re-analyzing its data against the draft numeric criteria (Rick Hafele, ODEQ, personal communication, February, 2002). The numeric criteria will be different than the values used in previous 303(d) lists. Water bodies placed on the 1998 303(d) list based on interpretation of the narrative biological criterion will be maintained on the 2002 303(d) list unless a TMDL addressing the listing has been approved by EPA. Biological data collected during the 2002 303(d) list cycle will be evaluated during the next list cycle.

ODEQ will report the results of the biological monitoring in the narrative discussion of the state's water quality program.

TRIBAL WATERS:

Only those waters that are under the State of Oregon's jurisdiction are subject to the State's 303(d) and 305(b) activities. Oregon's 303(d) list and "integrated report" does not intentionally include tribal waters.

When a waterbody lies partially within Tribal Reservation boundaries, DEQ will only include the portions that are within Oregon's jurisdiction on the State's 303(d) list. For the 2002 303(d) list, DEQ used a map provided by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) to determine which waters were within Umatilla tribal lands (data origin: BIA Geographic Data Service Center, publication date: 1999, title: Diminished Reservation Boundary for CTUIR).

Oregon does not develop TMDLs for tribal waters. When a 303(d) listed waterbody is fully on Tribal lands, the Tribe may work directly with EPA to develop the TMDL.

SCHEDULE:

The Department's process to develop the 2002 "Integrated Report" consisted of the following steps and timelines:

Data Gathering and Review: The Department actively sought out data collected by other federal and state agencies, tribes, local governments, watershed councils, private and public organizations and individuals. The Department put out a public notice from July 30, 2001 to November 2, 2001 seeking data on the condition of Oregon's surface waters. The public notice was sent to over 2500 names housed within ODEQ's mailing list. A news release was sent to all newspapers in the State of Oregon. Third party data received during this "call for data"and data collected by the Department were reviewed according to the assessment methodology.

Second Public Review Process: A draft 2002 "Integrated Report" and a draft 2002 303(d) list were released for public review from August 5, 2002 to November 1, 2002. A series of several Public Hearings were held throughout the state during this time period. A summary of the written and oral comments and DEQ's response to comments are available from DEQ as separate documents.

Final 2002 list: The draft 2002 "Integrated Report" and draft 2002 303(d) list were revised where appropriate, based on the review of public comments. Oregon's final 2002 303(d) list has been submitted to US EPA Region X with supporting documentation. The final 2002 "integrated report" was also given to EPA. Only water bodies placed in the category "The water body is water quality limited and requires a TMDL" (the 303(d) list) is subject to EPA's approval.

Parameter Specific Discussion:

The numeric and narrative criteria interpreted varied with the parameter being evaluated. The parameters are listed in alphabetic order on the following pages.

PARAMETER: **Aquatic Weeds or Algae**

BENEFICIAL USES AFFECTED: Water Contact Recreation, Aesthetics, Fishing

NUMERIC CRITERION: None

NARRATIVE CRITERION: OAR 340-41-(basin)(2)(h)

Standards applicable to all basins:

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

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): *Macrophytes:* Documented reports of an abundance of invasive, non-native macrophytes (those listed on the "A" or "B" Noxious Weed List maintained by the Department of Agriculture) that dominate the lake assemblage of plants and significantly reduces the surface area available for lake usage; frequent herbicide treatments to control aquatic weeds; or other activities initiated to manage weed growth such as through a Coordinated Resources Management Plan in response to frequent complaints about weeds interfering with various uses.

Periphyton (attached algae) or Phytoplankton (floating algae): Documented evidence that algae is causing other standard exceedences (e.g. pH or dissolved oxygen) or impairing a beneficial use.

ATTAINING CRITERION DETERMINATION (EPA CATEGORY 2):
Not applicable.

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Reports since October 1990.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT:
- No new data was submitted for this parameter.

PARAMETER: ***Escherichia coli*** **(E Coli) (freshwaters and estuarine waters other than shellfish growing waters)**

BENEFICIAL USES AFFECTED: Water Contact Recreation

NUMERIC CRITERIA: OAR 340-41-(basin)(2)(e)(A)(i)(I) and (II)

NARRATIVE CRITERION OAR 34041-(basin)(2)(f)

Standards applicable to all basins:

(e) Bacteria standards:
(A) Numeric criteria: Organisms of the coliform group commonly associated with fecal sources (MPN or equivalent membrane filtration using a representative number of samples) shall not exceed the criteria described in subparagraphs (i) and (ii) of this paragraph:

(i) Freshwaters and Estuarine Waters other than shellfish growing waters:

(I) A 30-day log mean of 126 *E. coli* organisms per 100 ml, based on a minimum of five (5) samples;

(II) No single sample shall exceed 406 *E. coli* organisms per 100 ml;

(f) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing or shellfish propagation, or otherwise injurious to public health shall not be allowed.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): A 30-day log mean of 126 *E coli* organisms per 100 ml or more than 10% of the samples exceed 406 *E coli* organisms per 100 ml, with a minimum of at least two exceedences.

ATTAINING CRITERION (EPA CATEGORY 2): The 30 day log mean is less than 126 *E coli* organisms per 100 ml and more than 90% of the samples are below 406 *E coli* organisms per 100 ml

INSUFFICIENT DATA CATEGORY (EPA CATEGORY 3): Less than 5 samples are available for analysis for the season of interest.

TIME PERIOD:
Summer: June 1 through September 30 (period of highest use for water contact recreation)
Fall-Winter-Spring (FWS): October 1 through May 31

DATA REQUIREMENTS:
Data collected since October 1990. A minimum of 5 representative data points available per site collected on separate days for the season of interest.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
- Oregon Department of Environmental Quality
- Clackamas County Water Environment Services
- Eugene Springfield Water Pollution Control Facility (WPCF)
- Upper Rogue Watershed Association
- North Santiam Watershed Council
- Umpqua Watershed Council
- Yachats Watershed Council

PARAMETER: **Fecal Coliform (marine waters and estuarine shellfish growing waters)**

BENEFICIAL USES AFFECTED: Shellfish harvesting

NUMERIC CRITERION: OAR 340-41-(basin)(2)(e)(A)(ii)
NARRATIVE CRITERION: OAR 340-41-(basin)(2)(f)

Standards applicable to North Coast, Mid Coast, South Coast, Umpqua and Rogue basins:

(e)(A)(ii) Marine waters and estuarine shellfish growing waters: A fecal coliform median concentration of 14 organisms per 100 milliliters, with not more than ten percent of the samples exceeding 43 organisms per 100 milliliters.

(f) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing or shellfish propagation, or otherwise injurious to public health shall not be allowed.

Oregon Department of Agriculture (ODA) determines the locations of commercial shellfish harvesting areas.

ODEQ has determined that the water quality criteria should be applied to water bodies that support recreational shellfish harvesting, as well as commercial shellfish harvesting (Minutes from the Estuary Workgroup Meeting, ODEQ, Newport, Oregon, July 13, 2001). The locations of recreational shellfish harvesting are based on: consultation with Oregon Department of Fish and Wildlife staff and Best Professional Judgment of ODEQ staff.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5):
For a datasets of less than 30 samples a minimum of 2 exceedances of 43 organisms/100 ml.
For datasets with greater than 30 samples, 10% of the samples must exceed 43 organisms/100mL.

Or

For datasets with a minimum of 5 samples, the median value is greater than 14 organisms/100 ml.

ATTAINING CRITERION (EPA CATEGORY 2): *90% of the samples are less than* 14 organisms/100 ml and the median value is less than 14 organisms/100 ml. The minimum number of samples is 5 per site.

INSUFFICIENT DATA (EPA CATEGORY 3): Less than 5 samples available for analysis.

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Data collected since October 1990. A minimum of 5 representative samples per site collected on separate days.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
- Oregon Department of Environmental Quality routine or intensive monitoring data

PARAMETER: **Chlorophyll a**

BENEFICIAL USES AFFECTED: Water Contact Recreation, Aesthetics, Fishing,

Water Supply, Livestock Watering

VALUES: OAR 340-41-150

Standards applicable to all basins:

340-41-150
(1)The following average Chlorophyll a values shall be used to identify water bodies where phytoplankton may impair the recognized beneficial uses:
(a) Natural lakes which thermally stratify: 0.01 mg/l
(b) Natural lakes which do not thermally stratify, reservoirs, rivers and estuaries: 0.015 mg/l

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): 3-month average Chlorophyll a value exceeds value referenced above.

ATTAINING GUIDANCE VALUE (EPA CATEGORY 2): 3-month average Chlorophyll a value is less than value referenced above.

INSUFFICIENT DATA (EPA CATEGORY 3): Less than 3 samples available for analysis.

TIME PERIOD:
Summer: June 1 through September 30 (period of highest use for water contact recreation)
Fall-Winter-Spring (FWS): October 1 to May 31

DATA REQUIREMENTS:
Data collected since October 1990. A minimum of 3 samples collected over any three consecutive months at a minimum of one representative location (e.g., above the deepest point of a lake or reservoir or at a point mid flow of a river).

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
- Departmental of Environmental Quality

PARAMETER: **Dissolved Oxygen**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life, Salmonid Fish Spawning, Salmonid Fish Rearing

NUMERIC CRITERIA:

OAR 340-41-(basin)(2)(A)
OAR 340-41-(basin)(2)(D)
OAR 340-41-(basin)(2)(E)
OAR 340-41-(basin)(2)(F)
OAR 340-41-(basin)(2)(G)
OAR 340-41-(basin)(2)(H)

(A) For water bodies identified by the Department as providing **salmonid spawning**, during the periods from spawning until fry emergence from the gravels, the following criteria apply:

(i) The dissolved oxygen shall not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/L or greater then the DO criterion is 9.0 mg/L;

(ii) Where conditions of barometric pressure, altitude and temperature preclude attainment of the 11.0 mg/L or 9.0 mg/l criteria, dissolved oxygen levels shall not be less than 95% of saturation.

(D) For water bodies identified by the Department as providing **cold-water aquatic life**, the dissolved oxygen shall not be less than 8.0 mg/l as an absolute minimum. Where conditions of barometric pressure, altitude and temperature preclude attainment of the 8.0 mg/l, dissolved oxygen shall not be less than 90% of saturation.

(E) For water bodies identified by the Department as providing **cool-water aquatic life**, the dissolved oxygen shall not be less than 6.5 mg/l as an absolute minimum.

(F) For water bodies identified by the Department as providing **warm-water aquatic life**, the dissolved oxygen shall not be less than 5.5 mg/l as an absolute minimum.

(G) For **estuarine water**, the dissolved oxygen concentrations shall not be less than 6.5 mg/l (for coastal water bodies).

(H) For **marine waters**, no measurable reduction in dissolved oxygen concentration shall be allowed.

ESTUARINE VS FRESHWATER CRITERIA:
In order to determine whether a sample should be evaluated according to the freshwater or estuarine criterion, ODEQ summarized conductivity data from coastal waters (Figures 4-6).
As seen in these plots, the conductivity dropped to about 200 uS/cm when salt water was not present.

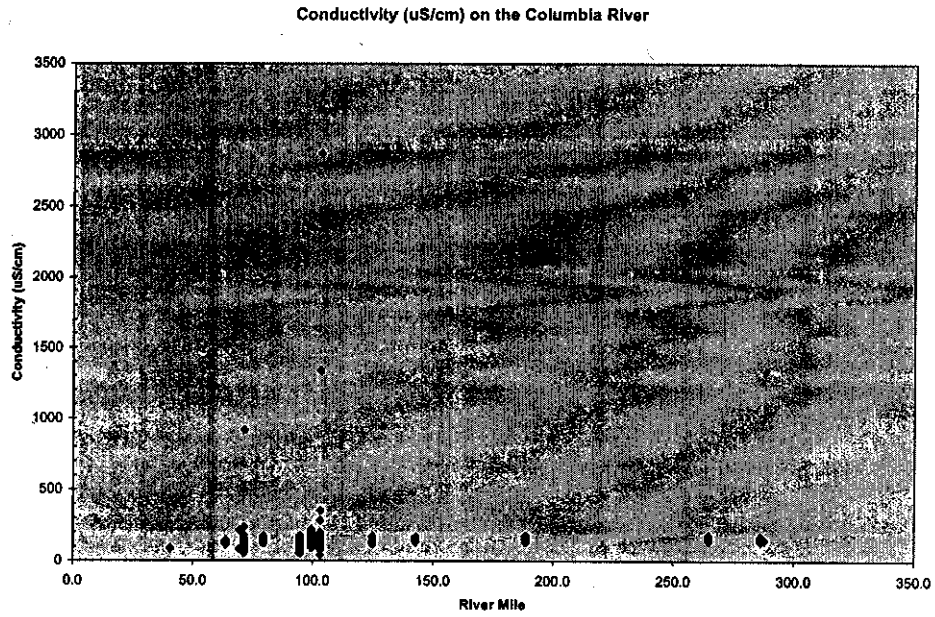


Figure 4: Columbia River Conductivity

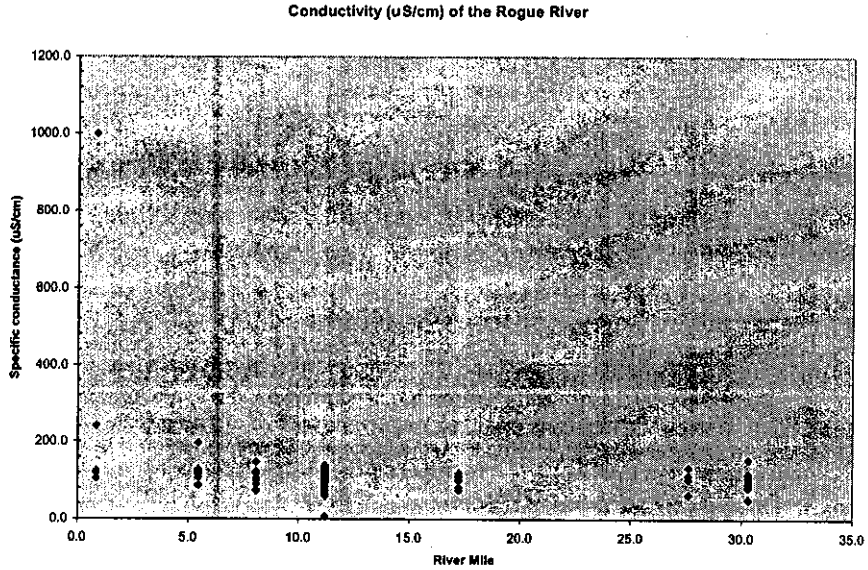


Figure 5: Rogue River Conductivity

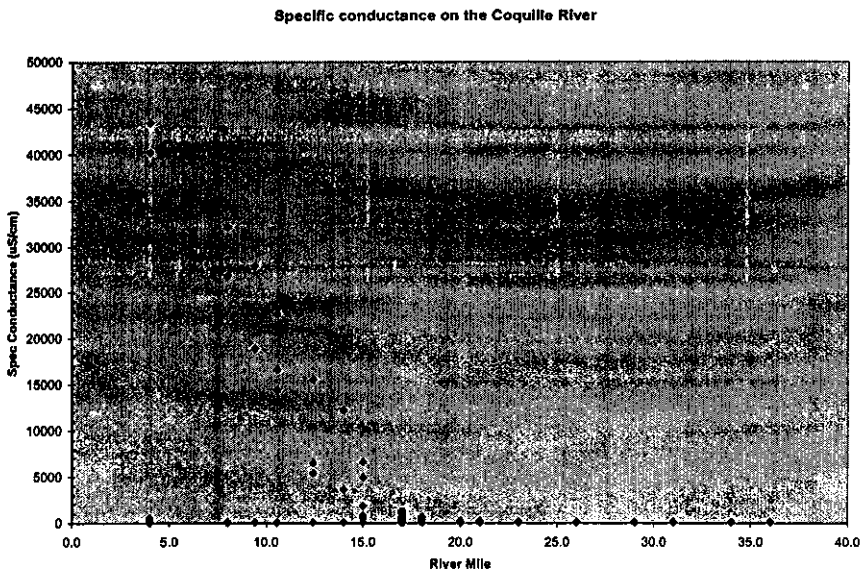


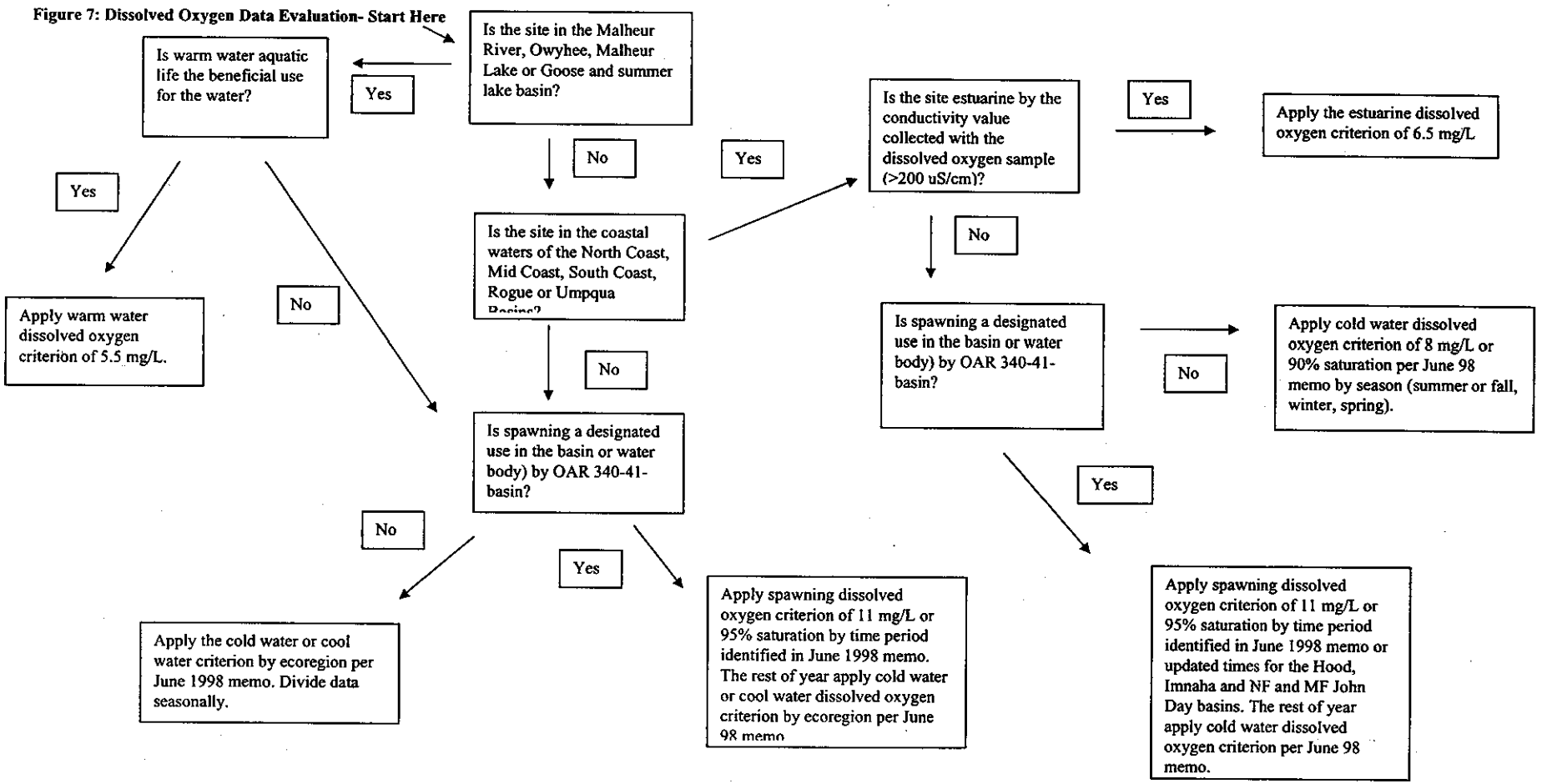
Figure 6: Coquille River Conductivity

For samples collected in the coastal waters of the North Coast, Mid Coast, South Coast, Rogue and Umpqua basins, the conductivity of each sample was evaluated against 200 uS/cm. If the recorded conductivity was greater than 200 uS/cm, the estuarine dissolved oxygen criterion of 6.5 mg/L was used. If the recorded conductivity was less than 200 uS/cm, the appropriate freshwater criteria were applied.

To determine the appropriate freshwater criterion to apply to a dataset, ODEQ referred to Table 4 contained in this document. The time period for application of the spawning criterion is determined by basin. For time periods other than those identified as spawning, the cold water criterion is applied to the data, per the June 22, 1998 letter from ODEQ to EPA, Region X.

Freshwater sites- warm water, spawning, cold or cool criterion: Data collected in other than coastal waters is not subject to evaluation against the estuarine criterion. The warm water criterion is applied to waters where Salmonid Fish Rearing and Salmonid Fish Spawning are not listed as beneficial uses in Tables 1-19 (OAR 340-41-basin). Where salmonid spawning and salmonid rearing are beneficial uses, the spawning criterion is applied by the locations and time periods described in Table 4. For time periods other than spawning, the cold or cool water criteria apply, based on location of the sampling site in EPA ecoregions. The following chart summarizes the steps to determine the appropriate criterion to apply.

Figure 7: Dissolved Oxygen Data Evaluation- Start Here



WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5):
Greater than 10 percent of the samples exceed the appropriate criterion and a minimum of at least two exceedences of the criterion for the time period of interest.

ATTAINING CRITERION (EPA CATEGORY 2): At least 5 samples for the time period of interest. Greater than 90% of the samples meet the appropriate criterion.

INSUFFICIENT DATA (EPA CATEGORY 3): Less than 5 samples are available for the time period of interest.

DATA REQUIREMENTS:
Data collected since October 1990. A minimum of 5 representative data points available per site collected on separate days per applicable time period.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
- Oregon Department of Environmental Quality
- Eugene Springfield WPCF
- Rogue Valley Council of Government
- Applegate Watershed Council
- Baker County Soil and Water Conservation District (SWCD)
- Glenn and Gibson Watershed Council
- Upper Rogue Watershed Association
- Lost Creek Watershed Council
- Mohawk Watershed Partnership
- North Santiam Watershed Council
- Yachats Watershed Council

PARAMETER: **Habitat Modification**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life, Salmonid Fish Spawning, Salmonid Fish Rearing

NUMERIC CRITERION: None

NARRATIVE CRITERION: OAR 340-41-(basin)(2)(i)

Standards applicable to all basins:

The creation of tastes or odors or toxic or other **conditions that are deleterious to fish or other aquatic life** or affect the potability of drinking water or the palatability of fish or shellfish shall not be allowed.

-or-

OAR 340-41-027

Standards applicable to all basins:

Waters of the state shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
No new data was submitted for evaluation in 2002. DEQ is no longer placing water bodies on the 303(d) list due to habitat modification. All water bodies that were on previous 303(d) lists under this category are now in the "water quality limited but not by a pollutant – a TMDL is not required" category. The following section discusses how water bodies were previously evaluated and placed on the 303(d) list.

WATER QUALITY LIMITED DETERMINATION (but does not require the development of a TMDL because the impairment is not caused by a pollutant) **(EPA CATEGORY 4c):**

Documentation that habitat conditions are a significant limitation to fish or other aquatic life as indicated by the following information:

- Beneficial uses are impaired. This documentation can consist of data on aquatic community status that shows aquatic communities (primarily macroinvertebrates) which are 60% or less of the expected reference community **for both** multimetric scores and multivariate model scores.

-or-

- Where monitoring methods determined a Biotic Condition Index, Index of Biotic Integrity, or similar metric rating of poor or a significant departure from reference conditions utilizing a suggested EPA biomonitoring protocol or other technique acceptable to DEQ.

-or-

- Fishery data on escapement, redd counts, population survey, etc. that show fish species have declined due to water quality conditions; and

  Habitat conditions that are a significant limitation to fish or other aquatic life as documented through a watershed analysis or other published report which summarizes the data and utilizes standard protocols, criteria and benchmarks (e.g. those currently used and accepted by Oregon Fish and Wildlife or Federal agencies (PACFISH)). Habitat conditions considered here are represented by data that relate to channel morphology or in-stream habitat such as Large Woody Material, Pool Frequency, Channel Width:Depth Ratio. Other habitat factors are considered elsewhere - cobble embeddedness or percent fines would be considered under sedimentation, stream shading would be factored in under temperature, etc. Listings under these parameters remain on the 303(d) list unless one of the reasons for de-listing is met.

ATTAINING CRITERION (EPA CATEGORY 2):

- Streams with aquatic communities greater than 75% of expected reference communities using either multimetric or multivariate models are considered unimpaired.

TIME PERIOD:
Annual

PARAMETER:	**Flow Modification**
BENEFICIAL USES AFFECTED:	Resident Fish & Aquatic Life, Salmonid Fish Spawning & Rearing
NUMERIC CRITERION:	None
NARRATIVE CRITERION:	OAR 340-41-(basin)(2)(i)

Standards applicable to all basins:

The creation of tastes or odors or toxic or other **conditions that are deleterious to fish or other aquatic life** or affect the potability of drinking water or the palatability of fish or shellfish shall not be allowed.

-or-

OAR 340-41-027

Standards applicable to all basins:

Waters of the state shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
DEQ is no longer placing water bodies on the 303(d) list due to flow modification. All water bodies that were on previous 303(d) lists under this category are now in the "water quality limited but not by a pollutant – a TMDL is not required" category. The following section discusses how water bodies were previously evaluated and placed on the 303(d) list.

WATER QUALITY LIMITED DETERMINATION but does not require the development of a TMDL because the impairment is not caused by a pollutant **(EPA CATEGORY 4c):**

Documented flow conditions that are a significant limitation to fish or other aquatic life as indicated by the following information:

- an established or applied for Instream Water Right, and
- documentation that flows are not frequently being met such as through statistical summaries of stream flow based on actual flow measurements, and
- identification of human contribution to the reduction of instream flows below acceptable level indicated (e.g. evidence of water rights and diversions above or in the segment.

TIME PERIOD:
Annual

PARAMETER: **Nutrients**

BENEFICIAL USES AFFECTED: Aesthetics or use identified under related parameters

NUMERIC CRITERIA:
OAR 340-41-385(1) - Bear Creek Subbasin

Bear Creek and its tributaries:
Low Flow Season Approximately May 1 through November 30:
Total Phosphorus as P (mg/l) --0.08
Ammonia Nitrogen Nitrogen as N (mg/L) --0.25
High Flow Season Approximately December 1 through April 30:
Ammonia Nitrogen Nitrogen as N (mg/L) – 1.0

Clear Lake: Total Phosphorus as P as an annual loading: 241 pounds per year

Garrison Lake: Total Phosphorus as P as an annual loading: 562 pounds per year

Yamhill: Total Phosphorus as P (mg/l): May 1 through October 31
0.07

In addition to TMDLs in the Bear Creek, Clear Lake, Coast Fork, Garrison Lake, Tualatin River and Yamhill River, draft or proposed final TMDLs have been established for phosphorus to address pH, dissolved oxygen or other water quality problems in the following water bodies: Grande Ronde, and South Umpqua.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): Greater than 10 percent of the samples exceed criterion and a minimum of at least two exceedences of the criterion used in draft TMDLs for a season of interest.

WATER QUALITY LIMITED but a TMDL is not required because the TMDL has been completed **(EPA CATEGORY 4a):** TMDL completed for the nutrient of interest for the listed water body.

TIME PERIOD:
June through September or as specified under the criteria listed above.

DATA REQUIREMENTS:
Data collected since October 1990. A minimum of 5 representative data points available per site collected on separate days.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
No new data was submitted for evaluation in 2002.

PARAMETER: pH

BENEFICIAL USES AFFECTED: Resident Fish & Aquatic Life, Water Contact Recreation

NUMERIC CRITERIA: OAR 340-41-(basin)(2)(d)

Summary: pH shall not fall outside the following ranges:

General Basin Standards (adopted as of 1/11/96):

Basin	Range	Basin	Range
Deschutes Basin:	6.5 to 8.5	North Coast Basin	6.5 to 8.5
Goose & Summer Lake Basin	7.0 to 9.0*	Owyhee Basin	7.0 to 9.0*;
Grande Ronde Basin	6.5 to 9.0*	Powder Basin	6.5 to 9.0*;
Hood Basin	6.5 to 8.5	Rogue Basin	6.5 to 8.5
John Day Basin	6.5 to 9.0*	Sandy Basin	6.5 to 8.5
Klamath Basin:	6.5 to 9.0*	South Coast Basin:	6.5 to 8.5
Malheur River Basin	7.0 to 9.0*	Malheur Lake Basin	7.0 to 9.0*
Umpqua Basin	6.5 to 8.5	Mid Coast Basin:	6.5 to 8.5
Walla Walla Basin:	6.5 to 9.0*	Willamette Basin	6.5 to 8.5
Umatilla Basin	6.5 to 9.0*		

*when 25% of the measurements taken between June and September are greater than pH 8.7, the Department shall determine whether the value higher than 8.7 are anthropogenic or natural in origin

Water body Specific:

Marine Waters: 7.0 to 8.5
Cascade Lakes: 6.0 to 8.5
Columbia River: 7.0 to 8.5
Snake River: 7.0 to 9.0
Goose Lake: 7.5 to 9.5

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): A minimum of 5 samples per time period are required. More than 10 percent of the samples exceed criterion and a minimum of at least two exceedences of the criterion for the season of interest.

ATTAINING CRITERION (EPA CATEGORY 2): A minimum of 5 samples per time period (summer or fall/winter/spring) and 90% of the samples attain the criterion.

INSUFFICIENT DATA (EPA CATEGORY 3): Less than 5 samples are available per time period.

TIME PERIOD:
Summer: June 1 through September 30
Fall-Winter-Spring (FWS): October 1 to May 31

DATA REQUIREMENTS:
Data collected since October 1990. A minimum of 5 representative data points available per site collected on separate days for each season of interest.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
- Oregon Department of Environmental Quality
- Rogue Valley Council of Governments
- Baker County SWCD
- Glenn and Gibson Watershed Council
- John Day Watershed Council
- Upper Rogue Watershed Association

- Lost Creek Watershed Council
- Mohawk Watershed Partnership
- North Santiam Watershed Council
- Umpqua Watershed Council
- Yachats Watershed Council

PARAMETER: **Sedimentation**

BENEFICIAL USES AFFECTED: Resident Fish & Aquatic Life, Salmonid Fish Spawning & Rearing

NUMERIC CRITERIA: None

NARRATIVE CRITERIA: OAR 340-41-(basin)(2)(j)

Standards applicable to all basins:

The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry shall not be allowed.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): Documentation that sedimentation is a significant limitation to fish or other aquatic life as indicated by the following information:

Beneficial uses are impaired. This documentation can consist of data on aquatic community status that shows aquatic communities (primarily macroinvertebrates) which are 60% or less of the expected reference community **for both** multimetric scores and multivariate model scores.

or-

Where monitoring methods determined a Biotic Condition Index, Index of Biotic Integrity, or similar metric rating of poor or a significant departure from reference conditions utilizing a suggested EPA biomonitoring protocol or other technique acceptable to DEQ.

-or-

Fishery data on escapement, redd counts, population survey, etc. that show fish species have declined due to water quality conditions; and

Documentation through a watershed analysis or other published report which summarizes the data and utilizes standard protocols, criteria and benchmarks (e.g. those currently used and accepted by Oregon Fish and Wildlife or Federal agencies (PACFISH)). Measurements of cobble embeddedness or percent fines are considered under sedimentation. Documentation should indicate that there are conditions that are deleterious to fish or other aquatic life.

ATTAINING CRITERION (EPA CATEGORY 2): Streams with aquatic communities greater than 75% of expected reference communities using either multimetric or multivariate models are considered unimpaired.

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Data collected since October 1990 and included in the most recent watershed analysis or published report.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
U.S. Forest Service

PARAMETER: **Temperature**

BENEFICIAL USES AFFECTED: Resident Fish & Aquatic Life,
Salmonid Fish Spawning & Rearing

NARRATIVE CRITERIA: *OAR 340-41-(basin)(2)(b)*

Standards applicable to all basins (adopted 1/11/96, effective 7/1/96):

No measurable surface water increase from anthropogenic activities is allowed when surface water temperatures exceed:

- **64°F (17.8°C)** in basins for which salmonid rearing is a beneficial use;
- **55°F (12.8° C)** during times and in waters that support salmon spawning, egg incubation and fry emergence from the egg and from the gravels;
- **50°F (10°C)** in waters that support Oregon Bull Trout;
- **68°F (20°C)** in the Columbia River (mouth to river mile 309);
- **68°F (20°C)** in the Willamette River (mouth to river mile 50);

[except when the air temperature during the warmest seven-day period of the year exceeds the 90th percentile of the 7-day average daily maximum air temperature calculated in a yearly series over the historic record]

The numeric criteria are measured as the seven (7) day moving average of the daily maximum temperatures. If there is insufficient data to establish a seven – day moving average of the daily maximum temperatures, the numeric criteria shall be applied as an instantaneous maximum (OAR 340-41-0006(54)).

The Department used the 1997 Bull Trout distribution maps contained in "Status of *Oregon's Bull Trout", (Oregon Department of Fish and Wildlife, October 1997,* Buchanan, David, M. Hanson and R. Hooton, Portland, OR) to determine where to apply the bull trout criterion. The criterion applies to the stream reaches which indicate the "Spawning, Rearing, or Resident Adult Bull Trout" populations are present. A solid green line shows these waters on the maps that are referenced (ODEQ memo to EPA, June 22, 1998).

Figure 8 describes the temperature data evaluation process.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): Moving seven (7) day average of the daily maximum exceeds the appropriate criterion listed above. Where grab data (non-continuous data) were collected, more than 25 percent (and a minimum of at least two exceedences) of the samples exceed the appropriate criterion based on multi-year monitoring programs that collect representative samples on separate days for the season of concern.

ATTAINING CRITERION (EPA CATEGORY 2): Where continuous data were collected the moving seven (7) day average of the daily maximum attains the appropriate criterion listed above. In locations where grab data were collected, a minimum of five samples must be available. Greater than 90% of the samples must meet the appropriate criterion.

INSUFFICIENT DATA (EPA CATEGORY 3): Where grab data were collected, less than 5 samples are available for the time period of interest. Where continuous data were collected, insufficient data was available to calculate the seven day average of the daily maximums.

TIME PERIOD:
See Table 4.

DATA REQUIREMENTS:
Data collected since October 1990.

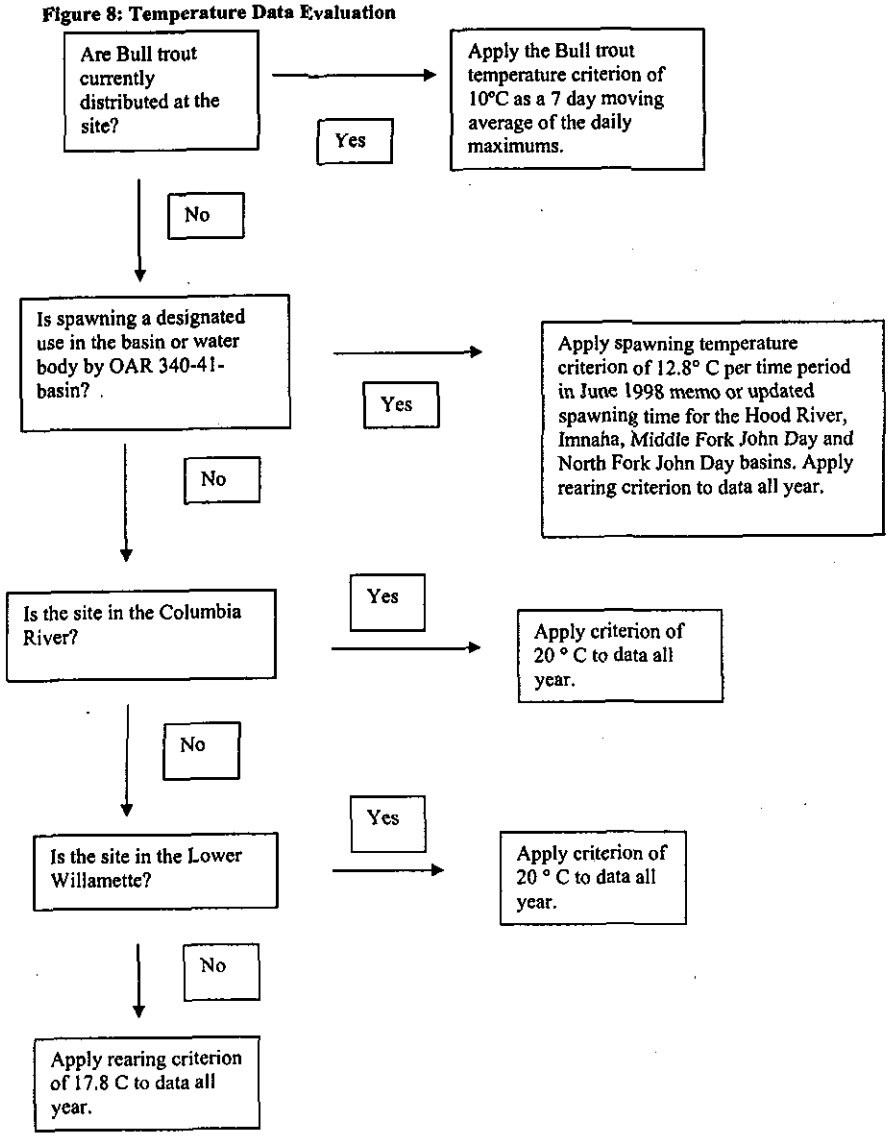
EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
Continuous temperature monitoring data collected by:

- Oregon Department of Environmental Quality
- U.S. Forest Service
- Bureau of Land Management

Grab temperature data collected by:

- Watershed councils

Figure 8: Temperature Data Evaluation



PARAMETER: **Total Dissolved Gas**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life

NARRATIVE CRITERION: OAR 340-41-(basin)(2)(n)

NUMERIC CRITERION: OAR 340-41-(basin)(2)(g)

Standards applicable to all basins:

(n) The concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection shall not exceed 110 percent of saturation.

(g) The liberation of dissolved gases, such as carbon dioxide, hydrogen sulfide, or other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such waters shall not be allowed.

Water body Specific:

- Columbia River had an alternate standard for specific periods of time since 1995 to allow additional spill over dams for fish passage

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): More than 10 percent of the samples exceed standard and a minimum of at least two exceedences of the standard or a survey that identified beneficial use impairment due to total dissolved gas such as assessment of fish condition;

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Data collected since October 1990. A minimum of 5 representative data points available per site collected on separate days or a representative survey that includes assessment of fish condition.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
No new data was submitted for evaluation in 2002.

PARAMETER: **Toxics**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life, Drinking Water

NUMERIC CRITERIA: OAR 340-41-(basin)(2)(p)(B)

NARRATIVE CRITERIA: OAR 340-41-(basin)(2)(p)(A)

Standards applicable to all basins:

> OAR 340-41-445(2)(p)(A): Toxic substances shall not be introduced above natural background levels in the waters of the state in amounts, concentrations, or combinations which may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely affect public health, safety, or welfare; aquatic life; wildlife; or other designated beneficial uses;
>
> OAR 340-41-445(2)(p)(B): Levels of toxic substances shall not exceed the criteria listed in Table 20 which were based on criteria established by EPA and published in Quality Criteria for Water (1986), unless otherwise noted;
>
> OAR 340-41-445(2)(p)(C): . . . Where no published EPA criteria exist for a toxic substance, public health advisories and other published scientific literature may be considered and used, if appropriate, to set guidance values.

Water Column Data Evaluation:
Sample results were compared to criteria contained in Table 20. These criteria can be viewed at:
http://www.deq.state.or.us/wq/wqrules/wqrules.htm

Several of the freshwater criteria in Table 20 are hardness dependent. These criteria are identified in Table 20 with a "+" notation. EPA has developed equations to calculate the criteria as a function of hardness as follows:

Acute:
Criteria maximum concentration (CMC) = $e^{(m_a[\ln(hardness)]+b_a)}$

Chronic:
Criteria chronic concentration (CCC) = $e^{(m_c[\ln(hardness)]+b_c)}$

The variables are defined as follows:

Metal	m_a	b_a	m_c	b_c
Cadmium	1.128	-3.828	0.7852	-3.490
Chromium	0.819	3.688	0.819	1.561
Copper	0.9422	-1.464	0.8545	-1.465
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	3.3612	0.8460	1.1645
Silver	1.72	-6.520		
Zinc	0.8473	0.8604	0.8473	0.7614

Where hardness was not measured directly, the following equation was used to calculate the hardness value (Standard Methods for the Examination of Water and Wastewater, 20th edition, 1998, American Public Health Association, American Water Works Association, Water Environment Federation):

Hardness, mg equivalent $CaCo_3$/L = 2.497{Ca, mg/L} + 4.1189 {Mg, mg/L)

If hardness was less than 25 mg/L, 25 mg/L was used as the default value. EPA describes the minimum hardness to be used when calculating hardness dependent freshwater metals criteria in 40 CFR Section 131.36(c)(4)(i).

The data are compared to the most stringent criteria applicable. Usually the most stringent criteria are those listed under the section labeled "Concentration in Units per Liter for Protection of Human Health" in Table 20. The water and fish ingestion criteria apply to all basins where fishing and water supply are listed as beneficial uses.

Most of the "toxics" data reviewed was sampled and analyzed by the US Geological Survey (USGS). The USGS previously used a minimum reporting level or "MRL" when reporting results for inorganic and organic parameters. The MRL is defined by the USGS as "the smallest measured concentration of a substance that can be reliably measured by using a given analytical method" (USGS 1999).[2] The MRL is the "less-than" value reported when an analyte either is not detected or is detected at a concentration less than the MRL.

USGS data is available on their website at:
http://water.usgs.gov/nwis/>

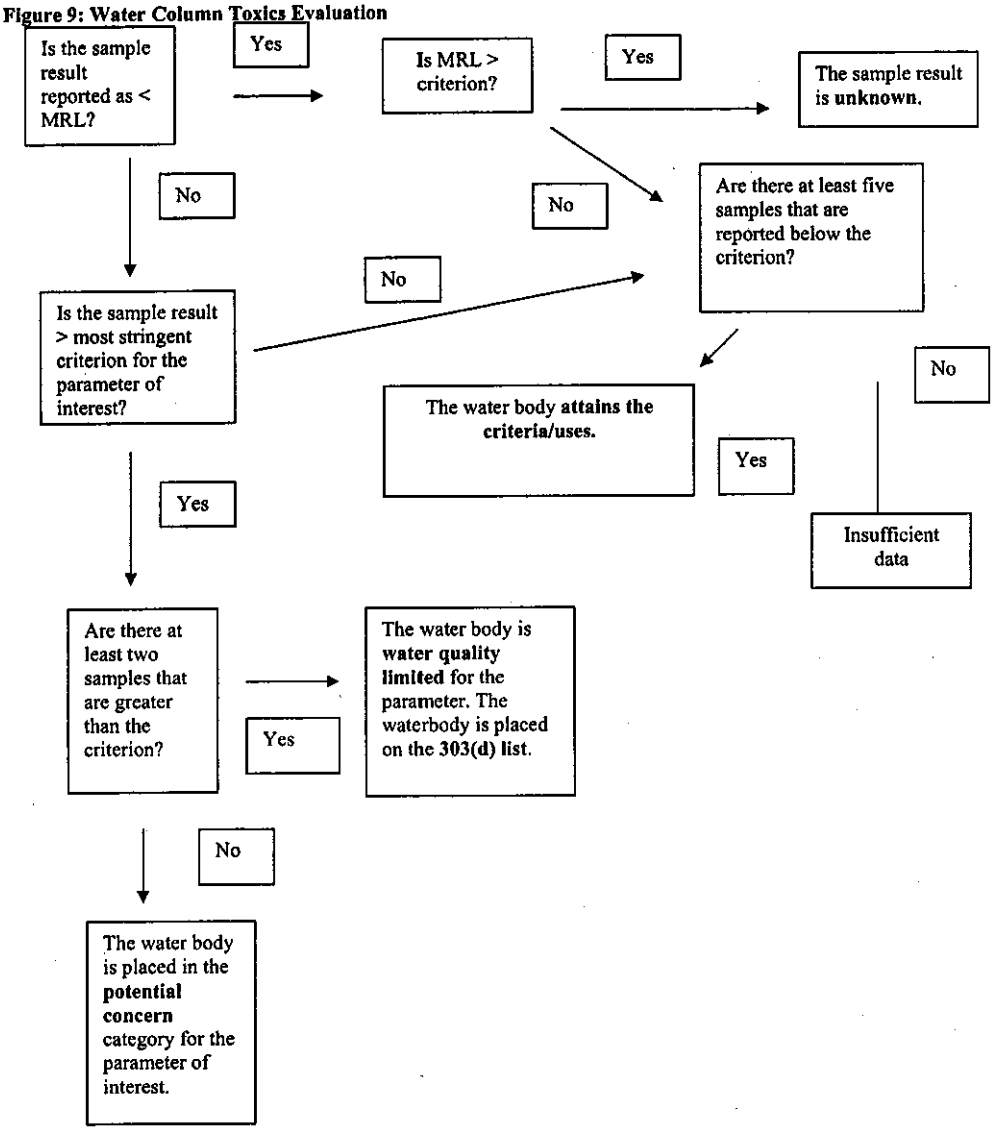
The data is recorded with remark codes in the following categories, where the "less than" value is the MRL:

< Actual value is known to be less than the value shown.
> Actual value is known to be greater than the value shown.

During the development of the 303(d) lists for 1996, 1998 and 2002, data was evaluated according to the following flow chart:

[2] U.S. Geological Survey, "New Reporting Procedures Based on Long Term Method Detection Levels and Some Considerations for Interpretations of Water Quality Data Provided by the US Geological Survey National Water Quality Laboratory", Childress, C.J. et al, 1999, Report 99-193.

Figure 9: Water Column Toxics Evaluation



Fish Tissue Data:

The chemical has been detected in more than 10% of available fish tissue samples, and the mean of the detects exceeds a threshold value derived from EPA water quality criteria. The threshold value is related to the water quality criteria as follows:

Fish Tissue Threshold Value = Table 20 Criteria for Protection of Human Health (ug/l)
* BCF (l/kg) * (mg/1000 ug)

where BCF = Bioconcentration Factor. BCFs were obtained from the EPA Region VIII Criteria Chart (July 1993).

Fish Consumption Advisories:

- A fish or shellfish consumption advisory or recommendation issued by the Health Division specifically refers to this chemical.

Bioassay data:

- The chemical has been found to cause a biological impairment via a field test of significance such as a bioassay. The field test must involve comparison to a reference condition.

Other Methodologies:

- Peer reviewed methodologies used for the determination of contaminant levels in the water column. Contaminant levels are compared directly to Table 20 criteria.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): For water column data and bioassay data, a minimum sample set of two, with a minimum of two exceedances of the applicable criteria.

ATTAINING CRITERIA (EPA CATEGORY 2): For water column data, a minimum sample set of five, with all sample results below the applicable criterion.

TIME PERIOD: Annual

DATA REQUIREMENTS:
Data collected since October 1990.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":

- Oregon Department of Environmental Quality
- U.S. Geological Survey
- Eugene Springfield Water Pollution Control Facility

PARAMETER: **Turbidity**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life, Water Supply,

Aesthetics

NARRATIVE CRITERION: OAR 340-41-(basin)(2)(c)

Standards applicable to all basins:

No more than ten percent cumulative increase in natural stream turbidities shall be allowed, as measured relative to a control point immediately upstream of the turbidity causing activities.

WATER QUALITY LIMITED CRITERIA: A systematic or persistent increase (of greater than 10%) in turbidity due to an operational activity that occurs on a persistent basis (e.g. dam release or irrigation return, etc).

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Data collected since October 1990 on a frequent enough basis (e.g. daily) to establish a relationship between water quality and a turbidity causing activity.

EXAMPLES OF DATA USED FOR 2002 "INTEGRATED REPORT":
No new data was submitted for evaluation in 2002.

INTEGRATED REPORT FORMAT:

The Integrated Report consists of the following columns: USGS 4th Field Subbasin, Water body Name, Water body LLID, Beginning and Ending River Mile, Parameter, Beneficial Uses, Criterion, Season, Supporting Data, Listing Status, Assessment Date.

Subbasin: The names are based on the USGS Hydrologic Unit Codes (HUCs) fourth field boundaries.

Water body Name: The name of the water body, utilizing the USGS stream names.

Water body LLID: The unique identifier for each water body.

Beginning and ending river mile: The length of the listing for the water body segment (in miles).

Parameter: Name of water quality parameter being considered.

Beneficial Uses: The beneficial uses the criteria are designed to protect.

Criteria: The narrative or numeric criteria the data are compared to and must meet to be in compliance with the standard.

Season: The time of year when the water quality standard is violated.

Supporting Data: A summary of the data evaluated during the assessment. The river mile of the sampling point(s) is included.

Listing Status:

- Attaining criteria/Uses
- WQL not needing a TMDL
- TMDL Approved
- 303(d) list
- Insufficient or no data
- Potential Concern

Assessment Year: This column identifies the year the assessment took place. Many of the water bodies that are identified with an assessment year of 1998 were actually assessed in 1996.

APPENDIX A

2002 303(d) LIST/DELIST DATA SUBMITTALS MINIMUM DATA REQUIREMENTS

The following quality assurance and quality control (QA/QC) requirements must be met by all data submitted in support of listing or delisting a waterbody segment in the Oregon 2002 303(d) List

- Identify and document precise sampling site location(s). The sampling location should be documented by latitude and longitude in either decimal degrees or degrees, minutes, seconds.

- Document date and time the samples were collected.

- Sampling and analysis must be conducted under a written QA/QC Plan or by established and approved protocols such as contained in the Water Quality Monitoring Technical Guidebook, The Oregon Plan for Salmon and Watersheds, July 1999. The QA/QC plan must contain the data quality objectives (DQOs). An example of a QA/QC project plan is available on DEQ's website at:

  http://waterquality.deq.state.or.us/wq/303dlist/QAPPExample.htm

- Chemistry samples must be analyzed in accordance with methods cited in the most recent edition of *Standard Methods for the Examination of Water and Waste Water,* or using EPA approved methods listed in the most recent update of 40 CFR 136. The analysis must utilize appropriate QA/QC protocols, such as routinely analyzing replicates, blanks, laboratory control samples (LCS) and spiked samples. Data using field kits is only acceptable if the kits use a method approved under 40 CFR 136 and the QA/QC protocols referenced above have been adhered to. *(See* DEQ Laboratory Field Sampling Reference Guide, *and* DEQ Laboratory Quality Assurance Manual.)

- Written documentation must be submitted indicating how the data was evaluated to ensure it met the QA/QC objectives including the data quality objectives.

- Samples analyzed must comply with preservation, transportation and holding time recommendations cited in the most recent edition of Standard Methods for the Examination of Water and Waste Water or the DEQ Laboratory Field Sampling Reference Guide".

- Data must be reported in standard units recommended in the relevant approved method.

- Instruments (pH, DO, Conductivity, Temperature, etc.) are to be operated and calibrated according to manufacturer's recommendations, or other acceptable, established procedure. Field measurements must be conducted using methods cited in the most recent edition of Standard Methods for Analysis of Water and Waste Water. For grab samples, duplicate samples will be taken at a minimum of 10% of the total number of monitoring sites (1 duplicate for every 10 sites).

Reference: Water Quality Monitoring Technical Guide Book, The Oregon Plan for Salmon and Watersheds July 1999. Available from Oregon Plan website at http://www.oregon-plan.org/status.html

- Continuous temperature monitoring must follow standardized field protocols. At a minimum, pre and post deployment accuracy checks must be conducted using a NIST (National Institute of Standards and Technology) traceable thermometer. For data to be acceptable it must be bracketed by two acceptable field temperature audits during the deployment period.

Reference: Water Quality Monitoring Technical Guide Book, The Oregon Plan for Salmon and Watersheds July 1999. Available from Oregon Plan website at http://www.oregon-plan.org/status.html

- Multi-parameter continuous monitors must be calibrated following the manufacturer's calibration procedures prior to field deployment. For data to be acceptable it must be bracketed by two acceptable field audits during the deployment period.

- Biological monitoring, including surveys of habitat and sedimentation, must follow standardized field protocols. Justification and description of appropriate reference conditions or location must be included.

  For macroinvertebrate assessments the Level 3 protocol described in the Oregon Plan Water Quality Monitoring Technical Guide Book, should be followed. Where other methods have been used, or for assessments of other aquatic assemblages (fish or periphyton for example), a sampling and analysis plan that defines the sampling and analysis procedures should be available. If biotic condition indexes have been used, the scoring criteria and method of developing scoring criteria must be described. Quality control and assurance (QC/QA) procedures for evaluating sampling variability and precision should also be available.

  References:
  Water Quality Monitoring Technical Guide Book, The Oregon Plan for Salmon and Watersheds July 1999. Available from Oregon Plan website at http://www.oregon-plan.org/status.html

  Reference Site Selection: A Six Step Approach for Selecting Reference Sites for Biomonitoring and Stream Evaluation Studies. 1999. Available from DEQ's website at: http://www.deq.state.or.us/lab/biomon/bio_rpt.htm

DRAFT

CONSOLIDATED ASSESSMENT AND LISTING METHODOLOGY

For

OREGON'S 2004 303(d) LIST of WATER QUALITY LIMITED WATERBODIES

And

INTEGRATED 305(b) REPORT

Oregon Department of Environmental Quality

March 2003

BACKGROUND:

Section 305(b) of the Clean Water Act (CWA) requires states to report on the extent to which all navigable waters meet water quality standards. All surface waters, including rivers, streams, lakes, ponds, reservoirs, wetlands, estuaries and coastal waters are considered "navigable" under the CWA.

Section 303(d) of the CWA requires each state to identify those waters for which existing required pollution controls are not stringent enough to achieve that State's water quality standards. These water bodies are considered "water quality limited" or "impaired." Once a water body is identified as being water quality limited, Section 303(d) requires that Total Maximum Daily Loads (TMDLs) be developed. TMDLs describe the amount of each pollutant a water body can receive and not violate water quality standards. EPA regulations require states to submit, along with the 303(d) list, a description of the methodology used to identify and prioritize waters for TMDL development.

Submissions of both water quality assessments are due to EPA every two years. Prior to 2002, States submitted the 303(d) list and the 305(b) report as separate documents. In the "2002 Integrated Water Quality Monitoring and Assessment Report Guidance" EPA recommends that States submit an integrated report that will satisfy Clean Water Act requirements for both Section 305(b) water quality reports and Section 303(d) lists of water quality limited water bodies. In the "integrated report" water bodies can fall into one of several categories depending on available data, water quality status and source of impairment.

ASSESSMENT METHODOLOGY

This document summarizes the assessment methodology to be used by the Oregon Department of Environmental Quality (ODEQ) to determine water quality standards attainment for both the 2004 305(b) water quality report and the 2004 303(d) list of impaired waters. The assessment methodology is based on the following documents:

- "2002 Integrated Water Quality Monitoring and Assessment Report Guidance", EPA, November 2001
- "Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates: Report Contents", EPA, 1997
- Oregon's Water Quality Standards
- "Consolidated Assessment and Listing Methodology" EPA, DRAFT April 20, 2001
- Oregon Department of Environmental Quality's Listing Criteria for the 1998 303(d) list
- Water Quality Monitoring, Technical Guide Book", the Oregon Plan for Salmon and Watersheds, July 1999.
- June 22, 1998 letter from ODEQ to EPA, Region X, providing policy clarifications for Oregon's water quality standards interpretation.

States must consider all existing and readily available data and information to prepare the Section 303(d) list. When the data and information meet reasonable and appropriate data quality requirements described in the State's assessment methodology, it must be used in the assessment. (Consolidated Assessment and Listing Methodology, Toward a Compendium of Best Practices, DRAFT April 20, 2001, EPA).

This document is divided into several parts:

1. Water quality standards discussion
2. Data evaluation process discussion including:
    - Metadata requirements
    - QA/QC requirements
    - Minimum number of samples
3. Integrated Report Categories
4. General policy issue discussion:
    - De-listing
    - Drought conditions
    - Segmentation
    - Narrative Biological Criterion
    - Tribal Waters
    - Schedule

5. Parameter Specific discussion including:
   - Decision trees to interpret dissolved oxygen, temperature and bacteria criteria
6. Integrated report format

Water Quality Standards:

The objective of the Clean Water Act (CWA) is to restore and maintain the physical, chemical and biological integrity of the Nation's waters (CWA 101(a)). To help implement these objectives, states develop and adopt water quality standards. Water quality standards include beneficial uses, narrative and numeric criteria and anti-degradation policies.

Oregon's water quality standards are contained in Oregon's Administrative Rules (OAR) 340 Division 41. Beneficial uses are listed in OAR 340 Division 41 by Oregon Water Resource Division basin. Examples of beneficial uses are shown in Table 1, the basin use table for the North Coast-Lower Columbia Basin (OAR 340-41-202).

Table 1: North Coast -Lower Columbia Basin Beneficial Uses

Beneficial Uses	Estuaries and Adjacent Marine Waters	Columbia River Mouth to RM 86	All other Streams and Tributaries Thereto
Public Domestic Water Supply[1]		X	X
Private Domestic Water Supply[1]		X	X
Industrial Water Supply	X	X	X
Irrigation		X	X
Livestock Watering		X	X
Anadromous Fish Passage	X	X	X
Salmonid Fish Rearing	X	X	X
Salmonid Fish Spawning	X	X	X
Resident Fish and Aquatic Life	X	X	X
Wildlife and Hunting	X	X	X
Fishing	X	X	X
Boating	X	X	X
Water Contact Recreation	X	X	X
Aesthetic Quality	X	X	X
Hydro Power			
Commercial Navigation & Transportation	X	X	
[1]With adequate pretreatment (filtration and disinfection) and natural quality to meet drinking water standards.			

Standards are designed to protect the most sensitive beneficial use within a water body. Listings can be based on: evidence of a numeric criteria exceedence; evidence of a narrative criteria exceedence; evidence of a beneficial use impairment; or anti-degradation (i.e. a declining trend in water quality such that it would exceed a standard prior to the next listing period).

Data Evaluation Process:

As part of the 2004 data evaluation process, ODEQ is requesting data from outside the agency. The public notice includes a description of the minimum data requirements for data to be evaluated for the "integrated report".

EPA recommends several steps be part of the data evaluation process (EPA, CALM, DRAFT April 2001). Each of these steps is discussed separately below:

Metadata requirements:

Determine if metadata accompanying the data set meets your agency's requirements; (e.g. determine adequacy and accuracy of geographic documentation in the data set). (EPA, CALM, DRAFT April 2001).

ODEQ uses a river reach system called "LLID". *Latitude-longitude identifiers (LLIDs) are* a system of unique identifiers for streams in the State. The identifier consists of the latitude/longitude at the mouth of the stream. Only one LLID exists for a stream. Some water bodies on the 2002 303(d) list do not have a LLID and do not appear on the map created using the streamnet system. Where water bodies did not have a LLID, a "placeholder" LLID can be created so that records may be retained in the database. Because these water bodies do not appear on the LLID map, there is no length assigned to them. Unless otherwise stated, the listing applies from the mouth to the headwaters. More information about the LLID system can be found at

http://www.streamnet.org/pnwr/PNWNAR.html

ODEQ required geographic information in the form of latitude/longitude, preferably recorded as decimal degrees, to be submitted with each sample. The source of the latitude/longitude was also requested (i.e. GPS; USGS Topo Map, 1:100,000 or 1:24,000 (include map scale); or specify other method). Site descriptions were also required.

The latitude and longitude and site description were used to determine the LLID and river mile for each site. The sampling stations were then placed on a map of the State's water bodies (reaches at 1:100,000) scale

Quality Assurance/Quality Control (QA/QC)

Screen documentation to determine if appropriate procedures were used and QA/QC measures were in place. (EPA, CALM, DRAFT April 2001).

The following description of QA/QC is taken from the Water Quality Monitoring Technical Guide Book, The Oregon Plan for Salmon and Watersheds, July 1999.

Quality Assurance (QA) is defined as: The overall management system of a project including the organization, planning, data collection, quality control, documentation, evaluation and reporting activities. QA provides the information needed to determine the data's quality and whether it meets the project's requirements.

Quality Control (QC) is defined as the routine technical activities intended primarily to control errors. Since errors can occur in either the field, the laboratory, or in the office, QC must be a part of each of these activities.

As part of QA/QC planning, data quality objectives need to be defined. These relate to the precision, accuracy, representation, completeness and comparability of the data.

For the 2004 integrated report, ODEQ will evaluate data quality differently depending on the parameter.

"Conventional" (i.e. E coli, pH, temperature, dissolved oxygen) data submitted to ODEQ was evaluated for precision and accuracy. Each of these terms is defined below.

Precision: Precision refers to the amount of agreement among repeated measurements of the same parameter. To determine precision, duplicate samples must be collected at a number of sample sites (Oregon Plan). For grab data to be used for the 2002 "integrated report", duplicate samples were to be collected at 10% of the total number of monitoring sites (1 duplicate for every 10 sites).

Accuracy: Accuracy measures how close the results are to a true or expected value. This is normally determined by measuring a standard or reference sample of a known amount and comparing how far the results at the monitoring site are from the reference value (Oregon Plan).

For the 2004 "integrated report" QA/QC accuracy will be determined by the equipment used (manufacturer and model) and the accuracy values recorded by the manufacturer. Pre and post deployment checks or a minimum of two field audits used to determine the accuracy of continuous temperature data.

Grab data (a sample collected at one point in time) for conventional parameters will be assigned a "Data Quality Level" according to Table 2. The data quality level (DQL) depends on a combination of quality control and method selection. The DQLs were developed by DEQ staff based on:

- The accuracy of the instrumentation as defined by the manufacturer
- The accuracy of the instrumentation/method based on experience of ODEQ laboratory staff
- Data analysis by ODEQ staff (see E Coli discussion)

E Coli precision calculations:
To determine the acceptable precision for E Coli data ODEQ used a method recommended by EPA. In this analysis, 228 paired samples were evaluated (Larry Caton, ODEQ, personal communication, June 12, 2002).

1) The difference in the results for the duplicates was calculated.
2) The average difference of the samples was calculated
3) The average difference was multiplied by 2.456 to determine the 95% confidence limit for the dataset (confidence limit from: Youden, W.J. and Steiner, E.H., Statistical Manual of the Association of Official Analytical Chemists, Washington D.C., Association of Official Analytical Chemists, 1975).
4) Based on this method, the precision for E coli was calculated to be 0.5 log.

Level C data is data which fails QA/QC review. Data that falls into this category includes data in which the duplicate samples were not within the range of precision stated in **Table 2: 303(d) and 305(b) Data Quality Level for Grab Data.** pH data is graded as Level C data if a gel electrode is used.

Level E data is data in which no duplicates or field checks were obtained for the parameter of interest. Level E data is data of "unknown" quality. Level C and Level E data **WILL NOT** be used in the 2004 303(d) list or the 305(b) report.

Table 2: 303(d) and 305(b) Data Quality Level for Grab Data

Data Quality Level	Temperature Methods	pH Methods	Dissolved Oxygen Methods	Turbidity	Conductivity	E. coli bacteria Methods	Nitrate	Data Uses
A	Thermometer Accuracy checked with NIST standard. A= +/- 0.5°C P= +/-1.0°C	Calibrated pH electrode (no gel electrodes) A= +/-0.2 pH unit P= +/-0.3 pH unit	Winkler titration or oxygen meter calibrated to a Winkler Titration A= +/-0.3 mg/L P= +/-0.5 mg/L	Nephlometric Turbidity Meter A = +/- 5 % of standard value If turbidity <20 NTU: P= +/- 2 NTUs If Turbidity > 20 NTU: P= +/- 5%	Meter Temperature correction to 25°C. A= +/- 7% of standard value P = +/- 2%	ODEQ Approved methods Duplicate sample P = +/- 0.5 log	Concentrations >0.025 mg/L: P = +/-10% Concentrations < 0.025 mg/L: P = +/-0.01 mg/L.	Used for 303(d) and 305(b) assessment
B	Thermometer Accuracy checked with NIST standard. A= +/-2.0°C P= +/-1.0°C	Any method with: A= +/-0.5 pH unit P= +/-0.5 pH unit (no gel electrodes)	Winkler titration or oxygen meter calibrated to a Winkler Titration A= +/-1 mg/L P= +/-1 mg/L	Any method with A = +/- 30% P= +/- 30%	Meter Temperature correction to 25°C A= +/-10% P= +/- 5%	ODEQ Approved methods Analysis done by a commercial lab	Concentrations >0.025 mg/L: P = +/-10% Concentrations < 0.025 mg/L: P = +/-0.01 mg/L.	Used for 303(d) and 305(b) assessment
C	A = >2.0°C	Any other method +/- 1 pH unit Data collected with gel electrodes	Any other method +/- 1 mg/L	Any other method with P > 30%	Meter without regular accuracy checks	Duplicate samples P>0.5 log	No precision checks (field duplicates)	Not used for 303(d) or 305(b) assessment and data is voided from DEQ database (failed QA/QC)
E	No precision	No	No precision checks	No precision	No precision checks	No precision checks	No precision checks	Education- not

	checks	precision checks		checks or Observations, clear, muddy, etc				used for 303(d) or 305(b) assessment

Continuous temperature data was graded using both pre- and post -deployment checks and field audits. For data to be DQL "A", pre and post deployment checks and a minimum of two field audits had to be included with the data files. Specific examples are outlined below.

Table 3: 303(d) and 305(b) Data Quality Level for Continuous Temperature Data[1]

Data Quality Level (DQL)	Pre- and Post- Deployment Accuracy Checks	Field Audit Accuracy Checks
A	Difference between NIST thermometer and logger < 0.50°C	Difference between NIST thermometer and logger < 1.5°C
B	Difference between NIST thermometer and logger > 0.50°C and < 1.0°C	Difference between NIST thermometer and logger > 1.5°C and < 2.0°C
C	Difference between NIST thermometer and logger > 1.0°C	Difference between NIST thermometer and logger > 2.0°C
E	No pre or post deployment accuracy checks were conducted	No field audits were conducted

For data to be DQL A both pre-and post-deployment checks and two field audits (at the beginning and end of the logger deployment period) must have been conducted and the accuracy must be at the "A" level.

If no pre- and post- deployment accuracy checks were conducted, but the beginning and ending field audits are either level "A" or "B", the data is level "B". Alternatively, if pre- and post- deployment accuracy checks were conducted and were at least level "B", but no field audits were conducted the data is level "B".

Data that fails any of the accuracy checks is graded as level "C" and is not used for 2004 303(d) or 305(b) evaluation.

Data accompanied by no accuracy checks is graded as level "E" and is not used for 2004 303(d) or 305(b) evaluation.

Data accompanied by one field audit, with no pre- and post-deployment accuracy checks is also level "E" data and not used for 2004 303(d) or 305(b) evaluation.

[1] All continuous temperature data was processed using Hydrostat Version 10.

Figure 1: Continuous Temperature Data Grading for Analyses with Pre- and Post- Deployment Accuracy Checks and a Minimum of 2 Field Audits:

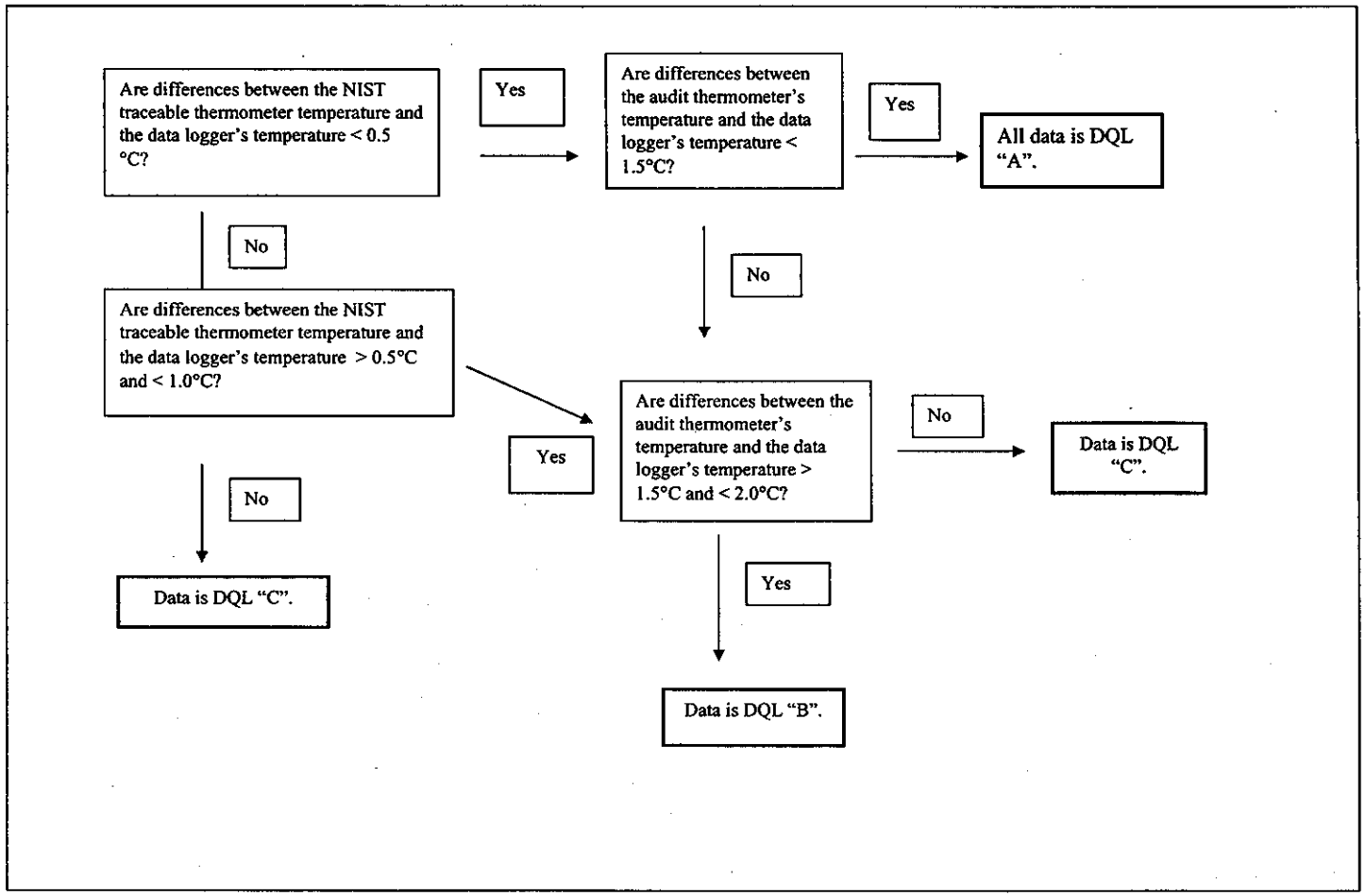
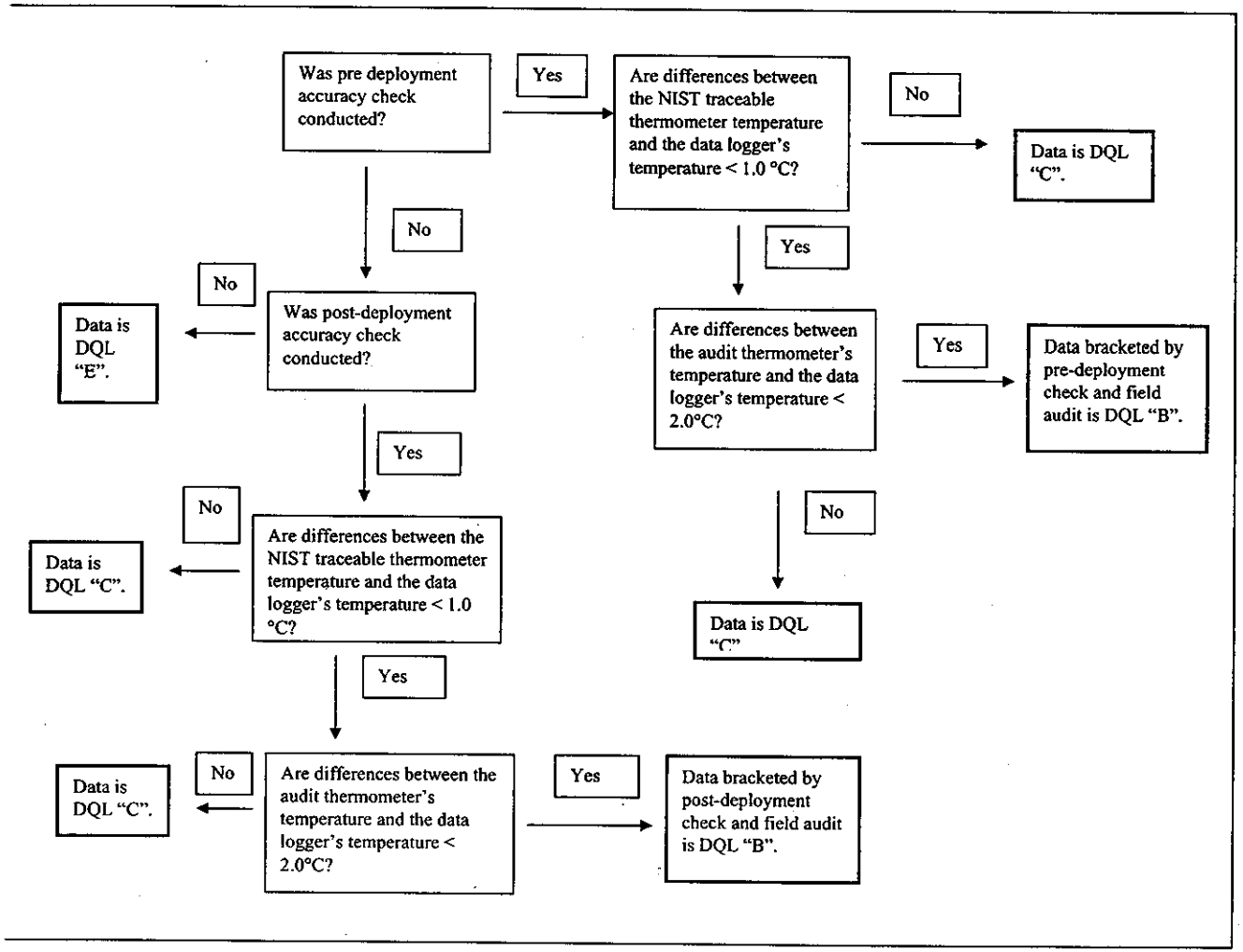


Figure 2: Continuous Temperature Data Grading for Analyses with Pre- or Post- Deployment Accuracy Checks and One (1) Field Audit:



Data quality for "toxics" (i.e. parameters included in Table 20) was not determined by evaluation of precision and accuracy. ODEQ required documentation of the analysis method. QA/QC plans had to be available for ODEQ review, but were not required with the data submittal. When possible, ODEQ compared data collected by third parties to data collected by ODEQ.

- *Review sample collection and analytical methods to determine compatibility with your agency's QA/QC requirements and SOPs; also determine if the third party's sample collection and analytical methods were actually followed in the creation of the data set.* . (EPA, CALM, DRAFT April 2001).

The method of analysis was to be documented in either the sample project's Quality Assurance Project Plan or in the data submittal form.

- *Determine if samples were collected under the appropriate conditions for comparison to water quality standards (e.g. correct time of year or flow conditions).* (EPA, CALM, DRAFT April 2001).

Oregon Department of Fish and Wildlife (ODFW) have anadromous fish distribution maps (Version 10) for several species including: coho, coastal cutthroat, summer and winter steelhead, fall and spring chinook and chum. These maps were used to determine the spawning locations for these species. The maps are available at: http://oregonstate.edu/dept/nrimp/information/fishdistdata.htm

Distribution maps are not available for resident species such as redband and rainbow trout (Martin Hill, ODFW, personal communication, March 2002). ODEQ staff will consult with ODFW district biologists to determine whether resident spawning occurs in specific water bodies, as requested during the public comment period on the draft 2004 303(d) list.

Applicable spawning times are documented in periodicity tables developed by ODFW. These tables focus on areas with anadromous fish. The area to be included in the periodicity tables can be seen at:

http://oregonstate.edu/dept/nrimp/24k/images/timing.jpg

To determine the applicable spawning time periods for basins with no periodicity information, DEQ will use the policy memo submitted by ODEQ to EPA, Region 10 on June 22, 1998. Table 4, modified from the memo, summarizes the default spawning time periods and locations for the remaining basins.

The default time periods and locations have been refined for the Hood River Basin, the Imnaha River Basin, the Middle Fork John Day River Basin and the North Fork John Day River basin. Additional documentation can be found at: http://www.deq.state.or.us/wq/standards/WQStdsBeneficialUses.htm

ODEQ will use the locations specified by DEQ's Bull Trout workgroup to determine bull trout distribution.

Table 4: Salmonid Spawning Time Periods

Basin	Salmonids Present within Basin	Spawning-Fry Emergence	Comments
Deschutes River and East Side Tributaries	BR, BT, BUT,CHF, K, RB, RT, STS	October 1 –June 30	
Deschutes River and West Side Tributaries	BR, BT, BUT,CHF, K, RB, RT, STS	September 1 – June 30	
Powder	BUT, RB, RT	March 1- June 30	Spawning is typically in upper portions of the basin
Malheur River	BUT, RB, RT	March 1- June 30	No spawning occurs in the Malheur River (Namorf to mouth), Willow Creek (Brogan to mouth), Bully Creek, (reservoir to mouth), and in the following reservoirs; Malheur, Bully Creek, Beulah and Warm Springs (OAR 340-41-802, Table 15); spawning in upper basin
Owyhee	RB, RT, LCT	March 1- June 30	No spawning occurs in the Owyhee River (RM 0-18) and in the following reservoirs: Antelope, Cow Creek, Owyhee (OAR 340-41-842, Table 16); spawning is typically in the upper portions of the basin
Malheur Lake	RB, RT, LCT	March 1- June 30	No spawning occurs in the natural lakes in the basin (OAR 340-41-882, Table 17); spawning is typically in the upper portions of the basin
Goose and Summer Lakes	BT, RT	March 1- June 30	No spawning occurs in Goose Lake and other highly alkaline and saline lakes (OAR 340-41-922, Table 18); spawning is typically in upper portions of the basin
Klamath	BT, RB, RT	March 1- June 30	Spawning occurs where natural conditions are suitable for salmonid fish use and no spawning occurs in the Klamath River from Klamath Lake to Keno Dam (RM 255 to 232.5), Lost River (RM 5 to 65) and

			Lost River Diversion Channel (OAR 340-41-962, Table 19)

Fish Species Coding:
BT= brook trout; BUT= bull trout; CH(X) = chinook salmon (F= fall, R=summer, S= spring); CO= coho salmon; CS= chum salmon; CT = cutthroat salmon; K = Kokanee; LCT = Lahontan cutthroat trout; RB = rainbow trout; RT = redband trout; SS =sockeye salmon; ST(X) = steelhead (S=summer, W = winter)

Minimum sample number:

Datasets are screened to determine if the minimum number of samples were available. The sample minimum is the same as that used in previous ODEQ 303(d) lists. Generally, at least 5 samples per parameter are required. Datasets that have less than 5 samples are labeled with the "insufficient data" category. If no data is submitted, by default the waterbody is placed in the "insufficient data" category. For datasets with at least 5 samples, 10% of the samples (with a minimum of two exceedances) have to exceed the applicable criterion for the water body to be considered water quality limited.

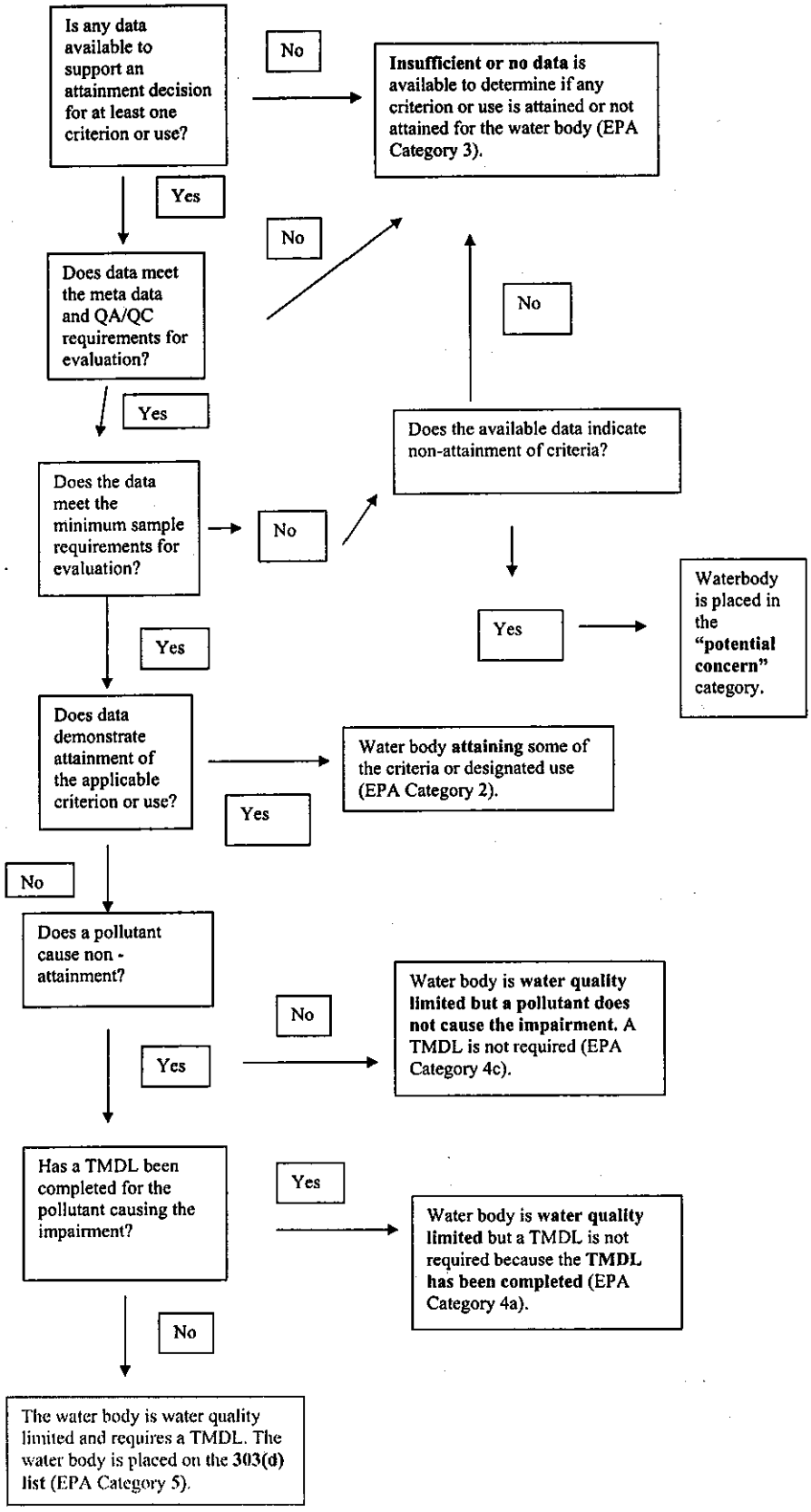
For water bodies to be placed in the "attaining criteria" category at least 5 samples per parameter are required and at least 90% of the samples in the dataset have to be in compliance with the applicable criterion.

Most of the data used in the 2002 integrated report has been stored in LASAR (Laboratory Analytical Storage and Retrieval), the database where DEQ stores data. The LASAR ID is a five digit code assigned to a sampling location based on the latitude/longitude and site description. Because the LASAR ID is based on the sampling location, it is possible for a LASAR ID to be assigned to more than one organization.

Integrated Report Categories:

The following flow chart (Figure 3) summarizes the assessment process. This flow chart approximates "Diagram 1" in EPA's "integrated report" guidance (EPA, November 2001).

Figure 3: Integrated Report Categories



General Policy Discussion:

DE-LISTING WATERBODIES:

Water bodies placed on previous 303(d) lists remain on the 2004 303(d) list unless they are de-listed. Water bodies may be removed from the 303(d) list for several reasons, each of which is presented below.

1. A water body may be moved to "attaining" (EPA category 2) if new information showing that water quality standards are being met is submitted. Data submitted for de-listing consideration was evaluated if it met a Data Quality Level of A or B and met the minimum sample requirements. Generally, it took similar data to de-list a water body as it took to place the water body on the 303(d) list. For example, if the listing was based on two successive years of a standard not being met, the Department would look for at least two successive years of data indicating that the standard is being met.
2. Data was submitted that identified a flaw in the original assessment. For example, a water body may have been placed on a previous 303(d) list based on data not collected following QA/QC requirements. If more recently collected data following the QA/QC requirements indicates compliance with the applicable criterion, the water body will be de-listed.

There are situations in which a water body may be water quality limited but does not have to be included on the 303(d) list.

1. The segment has a TMDL approved by EPA. Segments that have TMDLs established will be removed from the 303(d) list, but will retain their Water Quality Limited status (per OAR 340-41-006(30)) until they meet water quality standards. For the 2002 "integrated report" generally only those waters that were previously on the "303(d)" list were moved to the "TMDL Approved" category. Often TMDLs are developed on a watershed scale. All water bodies within these watersheds would be addressed by the TMDL and can be moved to the "TMDL Approved" category. These water bodies will be re-categorized in the 2004 "integrated report".
2. A pollutant does not cause the water body impairment. EPA defines a pollutant according to Section 502(6) of the Clean Water Act. ODEQ previously placed water bodies on the 303(d) list based on habitat modification and flow modification. Habitat modification listings were based on information indicating inadequate pool frequency and lack of large woody debris. Flow modification listings were based on inadequate flow to maintain instream water rights (IWR) purchased by Oregon Department of Fish and Wildlife. Because flow and habitat are not considered pollutants under the Clean Water Act, these water bodies were removed from the 303(d) list, and placed in the category "water quality limited but a pollutant does not cause the impairment".

DROUGHT CONDITIONS:

In previous 303(d) lists, drought years were determined based on declarations of a drought emergency in the Governor's office. Drought emergencies were declared in 1991, 1992 and in 1994 for selected counties. If a Drought Emergency declaration was made for a given year, drought conditions were assumed to apply to the entire state.

For the 2002 303(d) list, a drought year was determined based on the "Drought Monitor". The drought monitor is produced under a partnership consisting of the U.S. Department of Agriculture (Joint Agricultural Weather Facility and National Water and Climate Center), the National Weather Service's Climate Prediction Center, and the National Drought Mitigation Center at the University of Nebraska Lincoln. More information on the Drought Monitor can be found at http://enso.unl.edu/monitor/monitor.html.

According to the archives of the drought monitor all of Oregon was in a moderate drought by March 20, 2001. (http://enso.unl.edu/monitor/archive/2001/drmon0320.htm) For the 2002 303(d) list, 2001 was considered a drought year.

For the 2004 303(d) list, DEQ will use flow information collected by the US Geological Survey (USGS) to determine when a drought occurs. USGS maintains flow gages around the state and many of these gages have at least 30 years of record. DEQ will compare the 7Q10 (seven-day average low flow with a recurrence interval of 10 years) for each month in the historical record to the lowest 7-day average flow calculated for the months during which temperature data is collected, for the gage nearest the data

collection site. A month will be considered a "drought month" when the lowest 7-day average flow for that month is below the historical monthly 7Q10 flow for the gage.

Where multiple years of data are available, if the only data showing an exceedence of the criteria are data collected during a drought year, the segment will not be put on the 303(d) list but identified as "attaining criteria/uses". If only one year of data are available for a stream and this data was collected during a drought year, the stream will be identified as "potential concern" until it can be shown that the water does not meet standards in non-drought years.

SEGMENTATION:

Waterbody segment length is determined by a succession of steps:

- The segment lengths used for previous 303(d) lists are used as a starting point.
- If data indicates that segment lengths should be changed (i.e. data was submitted that showed that a portion of a previously listed segment was attaining the criterion), the new segment ended at the point of a confluence nearest the new sampling point.
- For a waterbody not previously evaluated, the waterbody segments are delineated by 5th field watershed boundaries.
- If the waterbody is contained within a 5th field watershed, and only one site is sampled, the entire length is categorized by the results of the one site.

The segment length can be changed in following 303(d) lists if data is submitted which indicates attainment of the criterion in a portion of the listed segment.

NARRATIVE BIOLOGICAL CRITERION:

The narrative biological criterion is described in OAR 340-41-027:

> *Standards applicable to all basins:*
> Waters of the state shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

In previous 303(d) lists, ODEQ evaluated biological data using multimetric scores and multivariate models. A water body was determined to be water quality limited by the following evaluation (ODEQ 1998 303(d) Listing Criteria):

> Aquatic communities (primarily macroinvertebrates) which are 60% or less of the expected reference community **for both** multimetric scores and multivariate model scores are considered impaired.

ODEQ is in the process of developing numeric biological criteria and is currently re-analyzing its data against the draft numeric criteria (Rick Hafele, ODEQ, personal communication, February, 2002). The numeric criteria will be different than the values used in previous 303(d) lists. Water bodies placed on the 1998 303(d) list based on interpretation of the narrative biological criterion will be maintained on the 2004 303(d) list unless a TMDL addressing the listing has been approved by EPA. Biological data collected during the 2004 303(d) list cycle will be evaluated once DEQ proposes the numeric biological criteria.

ODEQ will report the results of the biological monitoring in the narrative discussion of the state's water quality program.

TRIBAL WATERS:

Only those waters that are under the State of Oregon's jurisdiction are subject to the State's 303(d) and 305(b) activities. Oregon's 303(d) list and "integrated report" does not intentionally include tribal waters.

When a waterbody lies partially within Tribal Reservation boundaries, DEQ will only include the portions that are within Oregon's jurisdiction on the State's 303(d) list. For the 2002 303(d) list, DEQ used a map provided by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) to determine which waters were within Umatilla tribal lands (data origin: BIA Geographic Data Service Center, publication date: 1999, title: Diminished Reservation Boundary for CTUIR).

Oregon does not develop TMDLs for tribal waters. When a 303(d) listed waterbody is fully on Tribal lands, the Tribe may work directly with EPA to develop the TMDL.

SCHEDULE:

The Department's process to develop the 2004 "Integrated Report" will consist of the following steps and timelines:

Data Gathering and Review: The Department will solicit data collected by federal and other state agencies, tribes, local governments, watershed councils, private and public organizations and individuals. The Department put out a public notice from April 1, 2003 to May 16, 2003 seeking data on the condition of Oregon's surface waters. The public notice was sent to over 2500 names housed within ODEQ's mailing list. A news release was sent to all newspapers in the State of Oregon. Third party data received during this "call for data"and data collected by the Department will be reviewed according to the assessment methodology.

Second Public Review Process: A draft 2004 "Integrated Report" and a draft 2004 303(d) list will be released for public review. A series of Public Hearings will be held throughout the state during this time period. A summary of the written and oral comments and DEQ's response to comments will be available from DEQ as separate documents.

Final 2004 list: The draft 2004 "Integrated Report" and draft 2004 303(d) list will be revised where appropriate based on the review of public comments. Oregon's final 2004 303(d) list will be submitted to US EPA Region X with supporting documentation. The final 2004 "integrated report" will also be given to EPA. Only water bodies placed in the category "The water body is water quality limited and requires a TMDL" (the 303(d) list) is subject to EPA's approval.

Parameter Specific Discussion:

The numeric and narrative criteria interpreted varied with the parameter being evaluated. The parameters are listed in alphabetic order on the following pages.

PARAMETER: **Aquatic Weeds or Algae**

BENEFICIAL USES AFFECTED: Water Contact Recreation, Aesthetics, Fishing

NUMERIC CRITERION: None

NARRATIVE CRITERION: OAR 340-41-(basin)(2)(h)

Standards applicable to all basins:

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

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): Macrophytes: Documented reports of an abundance of invasive, non-native macrophytes (those listed on the "A" or "B" Noxious Weed List maintained by the Department of Agriculture) that dominate the lake assemblage of plants and significantly reduces the surface area available for lake usage; frequent herbicide treatments to control aquatic weeds; or other activities initiated to manage weed growth such as through a Coordinated Resources Management Plan in response to frequent complaints about weeds interfering with various uses.

Periphyton (attached algae) or Phytoplankton (floating algae): Documented evidence that algae is causing other standard exceedences (e.g. pH or dissolved oxygen) or impairing a beneficial use.

ATTAINING CRITERION DETERMINATION (EPA CATEGORY 2):
Not applicable.

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Reports since October 1992.

PARAMETER: ***Escherichia coli*** **(E Coli) (freshwaters and estuarine waters other than shellfish growing waters)**

BENEFICIAL USES AFFECTED: Water Contact Recreation

NUMERIC CRITERIA: OAR 340-41-(basin)(2)(e)(A)(i)(I) and (II)

NARRATIVE CRITERION OAR 34041-(basin)(2)(f)

Standards applicable to all basins:

(e) Bacteria standards:
(A) Numeric criteria: Organisms of the coliform group commonly associated with fecal sources (MPN or equivalent membrane filtration using a representative number of samples) shall not exceed the criteria described in subparagraphs (i) and (ii) of this paragraph:

(i) Freshwaters and Estuarine Waters other than shellfish growing waters:

(I) A 30-day log mean of 126 *E. coli* organisms per 100 ml, based on a minimum of five (5) samples;

(II) No single sample shall exceed 406 *E. coli* organisms per 100 ml;

(f) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing or shellfish propagation, or otherwise injurious to public health shall not be allowed.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): A 30-day log mean of 126 *E coli* organisms per 100 ml or more than 10% of the samples exceed 406 *E coli* organisms per 100 ml, with a minimum of at least two exceedences.

ATTAINING CRITERION (EPA CATEGORY 2): The 30 day log mean is less than 126 *E coli* organisms per 100 ml and more than 90% of the samples are below 406 *E coli* organisms per 100 ml

INSUFFICIENT DATA CATEGORY (EPA CATEGORY 3): Less than 5 samples are available for analysis for the season of interest.

TIME PERIOD:
Summer: June 1 through September 30 (period of highest use for water contact recreation)
Fall-Winter-Spring (FWS): October 1 through May 31

DATA REQUIREMENTS:
Data collected since October 1992. A minimum of 5 representative data points available per site collected on separate days for the season of interest.

PARAMETER: **Fecal Coliform (marine waters and estuarine shellfish growing waters)**

BENEFICIAL USES AFFECTED: Shellfish harvesting

NUMERIC CRITERION: OAR 340-41-(basin)(2)(e)(A)(ii)
NARRATIVE CRITERION: OAR 340-41-(basin)(2)(f)

Standards applicable to North Coast, Mid Coast, South Coast, Umpqua and Rogue basins:

(e)(A)(ii) Marine waters and estuarine shellfish growing waters: A fecal coliform median concentration of 14 organisms per 100 milliliters, with not more than ten percent of the samples exceeding 43 organisms per 100 milliliters.

(f) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing or shellfish propagation, or otherwise injurious to public health shall not be allowed.

Oregon Department of Agriculture (ODA) determines the locations of commercial shellfish harvesting areas.

ODEQ has determined that the water quality criteria should be applied to water bodies that support recreational shellfish harvesting, as well as commercial shellfish harvesting (Minutes from the Estuary Workgroup Meeting, ODEQ, Newport, Oregon, July 13, 2001). The locations of recreational shellfish harvesting are based on: consultation with Oregon Department of Fish and Wildlife staff and Best Professional Judgment of ODEQ staff.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5):
For a datasets of less than 30 samples a minimum of 2 exceedances of 43 organisms/100 ml.
For datasets with greater than 30 samples, 10% of the samples must exceed 43 organisms/100mL.

Or

For datasets with a minimum of 5 samples, the median value is greater than 14 organisms/100 ml.

ATTAINING CRITERION (EPA CATEGORY 2): 90% of the samples are less than 14 organisms/100 ml and the median value is less than 14 organisms/100 ml. The minimum number of samples is 5 per site.

INSUFFICIENT DATA (EPA CATEGORY 3): Less than 5 samples available for analysis.

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Data collected since October 1992. A minimum of 5 representative samples per site collected on separate days.

PARAMETER: **Chlorophyll a**

BENEFICIAL USES AFFECTED: Water Contact Recreation, Aesthetics, Fishing,

Water Supply, Livestock Watering

VALUES: OAR 340-41-150

Standards applicable to all basins:

340-41-150
(1)The following average Chlorophyll a values shall be used to identify water bodies where phytoplankton may impair the recognized beneficial uses:

(a) Natural lakes which thermally stratify: 0.01 mg/l
(b) Natural lakes which do not thermally stratify, reservoirs, rivers and estuaries: 0.015 mg/l

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): 3-month average Chlorophyll a value exceeds value referenced above.

ATTAINING GUIDANCE VALUE (EPA CATEGORY 2): 3-month average Chlorophyll a value is less than value referenced above.

INSUFFICIENT DATA (EPA CATEGORY 3): Less than 3 samples available for analysis.

TIME PERIOD:
Summer: June 1 through September 30 (period of highest use for water contact recreation)
Fall-Winter-Spring (FWS): October 1 to May 31

DATA REQUIREMENTS:
Data collected since October 1992. A minimum of 3 samples collected over any three consecutive months at a minimum of one representative location (e.g., above the deepest point of a lake or reservoir or at a point mid flow of a river).

PARAMETER: **Dissolved Oxygen**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life, Salmonid Fish Spawning, Salmonid Fish Rearing

NUMERIC CRITERIA:

OAR 340-41-(basin)(2)(A)
OAR 340-41-(basin)(2)(D)
OAR 340-41-(basin)(2)(E)
OAR 340-41-(basin)(2)(F)
OAR 340-41-(basin)(2)(G)
OAR 340-41-(basin)(2)(H)

(A) For water bodies identified by the Department as providing **salmonid spawning**, during the periods from spawning until fry emergence from the gravels, the following criteria apply:

(i) The dissolved oxygen shall not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/L or greater then the DO criterion is 9.0 mg/L;

(ii) Where conditions of barometric pressure, altitude and temperature preclude attainment of the 11.0 mg/L or 9.0 mg/l criteria, dissolved oxygen levels shall not be less than 95% of saturation.

(D) For water bodies identified by the Department as providing ***cold-water aquatic life***, the dissolved oxygen shall not be less than 8.0 mg/l as an absolute minimum. Where conditions of barometric pressure, altitude and temperature preclude attainment of the 8.0 mg/l, dissolved oxygen shall not be less than 90% of saturation.

(E) For water bodies identified by the Department as providing **cool-water aquatic life**, the dissolved oxygen shall not be less than 6.5 mg/l as an absolute minimum.

(F) For water bodies identified by the Department as providing **warm-water aquatic life**, the dissolved oxygen shall not be less than 5.5 mg/l as an absolute minimum.

(G) For **estuarine water**, the dissolved oxygen concentrations shall not be less than 6.5 mg/l (for coastal water bodies).

(H) For **marine waters**, no measurable reduction in dissolved oxygen concentration shall be allowed.

ESTUARINE VS FRESHWATER CRITERIA:
In order to determine whether a sample should be evaluated according to the freshwater or estuarine criterion, ODEQ summarized conductivity data from coastal waters (Figures 4-6).
As seen in these plots, the conductivity dropped to about 200 uS/cm when salt water was not present.

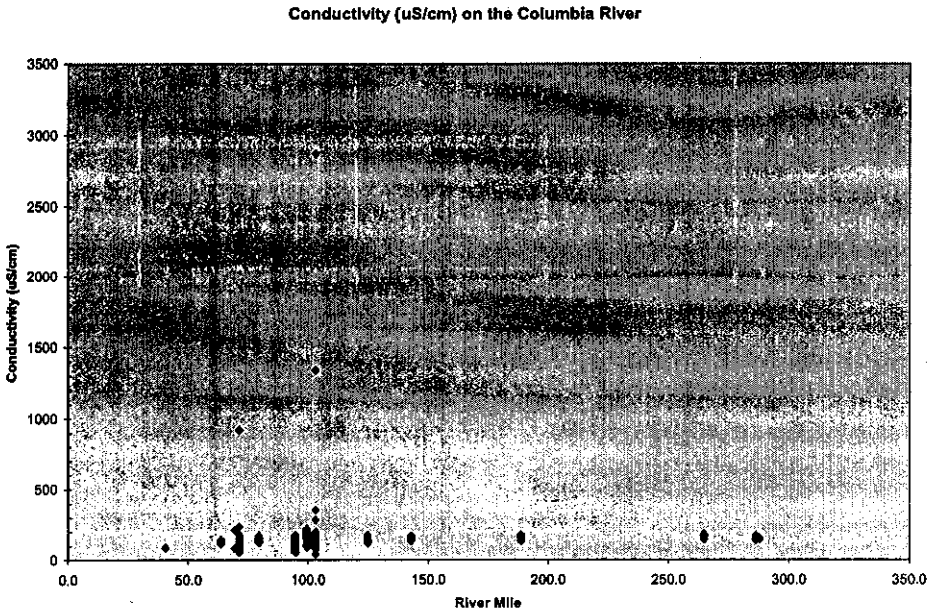


Figure 4: Columbia River Conductivity

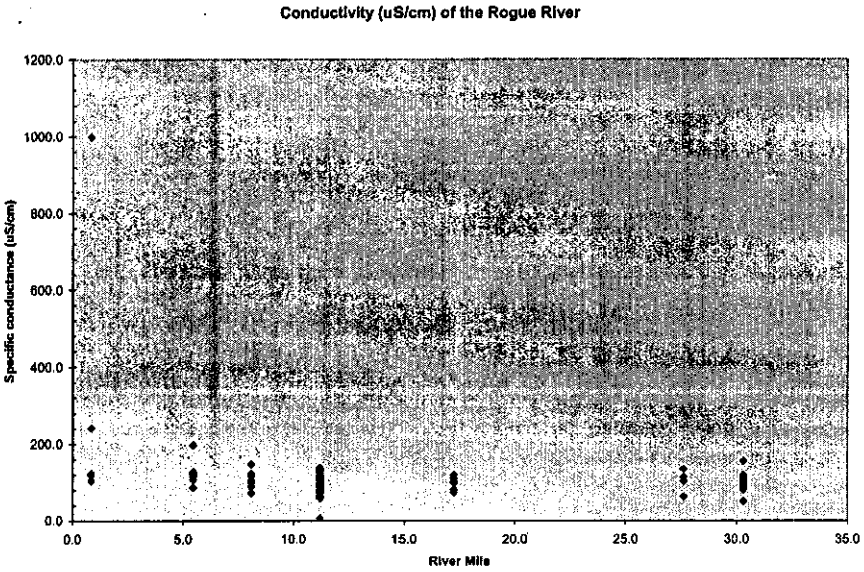


Figure 5: Rogue River Conductivity

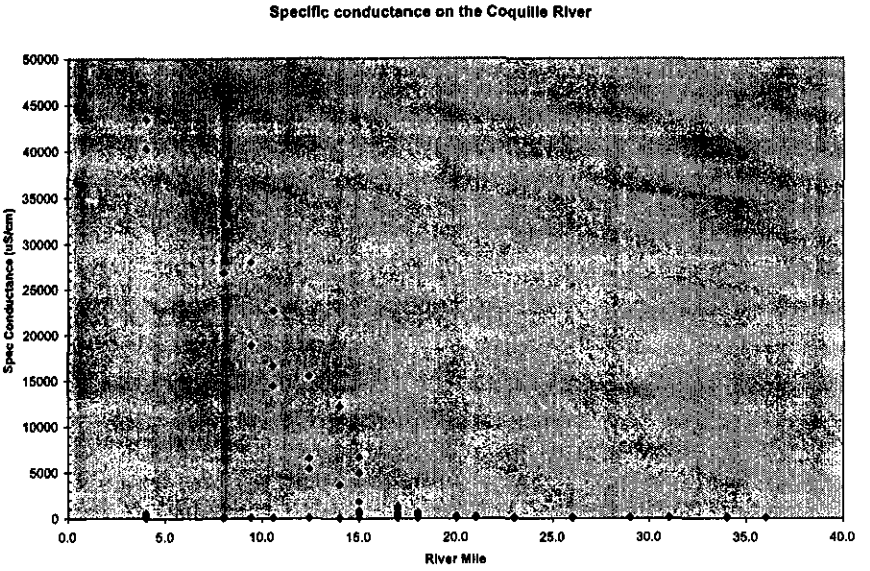


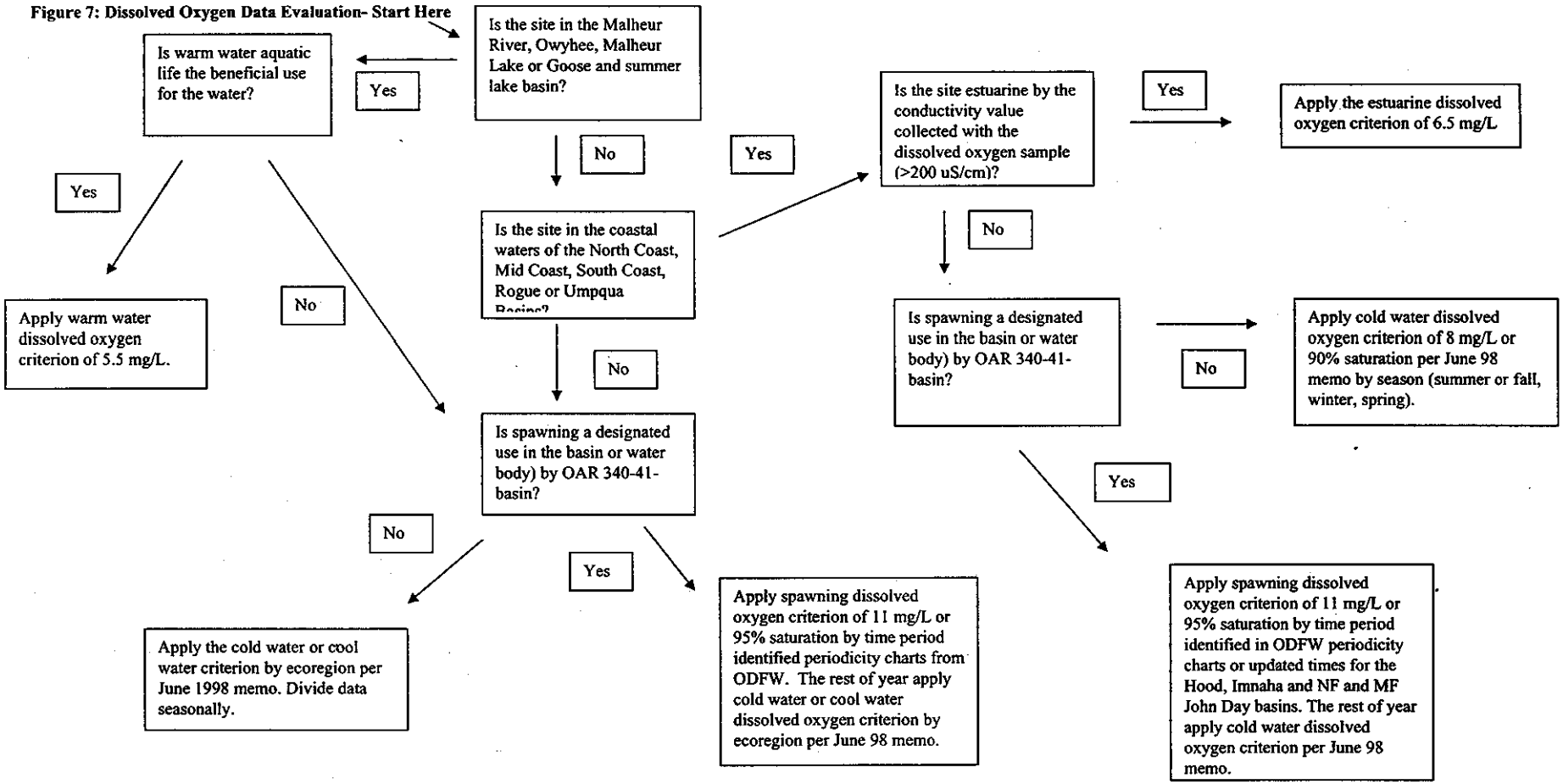
Figure 6: Coquille River Conductivity

For samples collected in the coastal waters of the North Coast, Mid Coast, South Coast, *Rogue and Umpqua basins, the conductivity of each sample was evaluated against* 200 uS/cm. If the recorded conductivity was greater than 200 uS/cm, the estuarine dissolved oxygen criterion of 6.5 mg/L was used. If the recorded conductivity was less than 200 uS/cm, the appropriate freshwater criteria were applied.

To determine when to apply the spawning criterion to the freshwater samples DEQ will refer to the periodicity information provided by ODFW. For time periods other than those *identified as spawning, the cold water criterion is applied to the data, per the June 22,* 1998 letter from ODEQ to EPA, Region X.

Freshwater sites- warm water, spawning, cold or cool criterion: Data collected in other than coastal waters is not subject to evaluation against the estuarine criterion. The warm water criterion is applied to waters where Salmonid Fish Rearing and Salmonid Fish Spawning are not listed as beneficial uses in Tables 1-19 (OAR 340-41-basin). Where salmonid spawning and salmonid rearing are beneficial uses, the spawning criterion is applied by the locations and time periods described previously. For time periods other than spawning, the cold or cool water criteria apply, based on location of the sampling site in EPA ecoregions. The following chart summarizes the steps to determine the appropriate criterion to apply.

Figure 7: Dissolved Oxygen Data Evaluation- Start Here



WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5):
Greater than 10 percent of the samples exceed the appropriate criterion and a minimum of at least two exceedences of the criterion for the time period of interest.

ATTAINING CRITERION (EPA CATEGORY 2): At least 5 samples for the time period of interest. Greater than 90% of the samples meet the appropriate criterion.

INSUFFICIENT DATA (EPA CATEGORY 3): Less than 5 samples are available for the time period of interest.

DATA REQUIREMENTS:
Data collected since October 1992. A minimum of 5 representative data points available per site collected on separate days per applicable time period.

PARAMETER: **Nutrients**

BENEFICIAL USES AFFECTED: Aesthetics or use identified under related parameters

NUMERIC CRITERIA:
OAR 340-41-385(1) - Bear Creek Subbasin

Bear Creek and its tributaries:
Low Flow Season Approximately May 1 through November 30:
Total Phosphorus as P (mg/l) --0.08
Ammonia Nitrogen Nitrogen as N (mg/L) --0.25
High Flow Season Approximately December 1 through April 30:
Ammonia Nitrogen Nitrogen as N (mg/L) – 1.0

Clear Lake: Total Phosphorus as P as an annual loading: 241 pounds per year

Garrison Lake: Total Phosphorus as P as an annual loading: 562 pounds per year

Yamhill: Total Phosphorus as P (mg/l): May 1 through October 31
0.07

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): Greater than 10 percent of the samples exceed criterion and a minimum of at least two exceedences of the criterion used in draft TMDLs for a season of interest.

WATER QUALITY LIMITED but a TMDL is not required because the TMDL has been completed **(EPA CATEGORY 4a):** TMDL completed for the nutrient of interest for the listed water body.

TIME PERIOD:
June through September or as specified under the criteria listed above.

DATA REQUIREMENTS:
Data collected since October 1992. A minimum of 5 representative data points available per site collected on separate days.

PARAMETER: pH

BENEFICIAL USES AFFECTED: Resident Fish & Aquatic Life, Water Contact Recreation

NUMERIC CRITERIA: *OAR 340-41-(basin)(2)(d)*

Summary: pH shall not fall outside the following ranges:

General Basin Standards (adopted as of 1/11/96):

Basin	Range	Basin	Range
Deschutes Basin:	6.5 to 8.5	North Coast Basin	6.5 to 8.5
Goose & Summer Lake Basin	7.0 to 9.0*	Owyhee Basin	7.0 to 9.0*;
Grande Ronde Basin	6.5 to 9.0*	Powder Basin	6.5 to 9.0*;
Hood Basin	6.5 to 8.5	Rogue Basin	6.5 to 8.5
John Day Basin	6.5 to 9.0*	Sandy Basin	6.5 to 8.5
Klamath Basin:	6.5 to 9.0*	South Coast Basin:	6.5 to 8.5
Malheur River Basin	7.0 to 9.0*	Malheur Lake Basin	7.0 to 9.0*
Umpqua Basin	6.5 to 8.5	Mid Coast Basin:	6.5 to 8.5
Walla Walla Basin:	6.5 to 9.0*	Willamette Basin	6.5 to 8.5
Umatilla Basin	6.5 to 9.0*		

*when 25% of the measurements taken between June and September are greater than pH 8.7, the Department shall determine whether the value higher than 8.7 are anthropogenic or natural in origin

Water body Specific:

Marine Waters: 7.0 to 8.5
Cascade Lakes: 6.0 to 8.5
Columbia River: 7.0 to 8.5
Snake River: 7.0 to 9.0
Goose Lake: 7.5 to 9.5

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): A minimum of 5 samples per time period are required. More than 10 percent of the samples exceed criterion and a minimum of at least two exceedences of the criterion for the season of interest.

ATTAINING CRITERION (EPA CATEGORY 2): A minimum of 5 samples per time period (summer or fall/winter/spring) and 90% of the samples attain the criterion.

INSUFFICIENT DATA (EPA CATEGORY 3): Less than 5 samples are available per time period.

TIME PERIOD:
Summer: June 1 through September 30
Fall-Winter-Spring (FWS): October 1 to May 31

DATA REQUIREMENTS:
Data collected since October 1992. A minimum of 5 representative data points available per site collected on separate days for each season of interest.

PARAMETER:	**Sedimentation**
BENEFICIAL USES AFFECTED:	Resident Fish & Aquatic Life, Salmonid Fish Spawning & Rearing
NUMERIC CRITERIA:	None
NARRATIVE CRITERIA:	OAR 340-41-(basin)(2)(j)

Standards applicable to all basins:

The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry shall not be allowed.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): Stream specific documentation that a beneficial use is impaired **and** that excessive sediment is a concern.

Beneficial use impairment:
Data on aquatic community status that shows macroinvertebrate communities are 60% or less of the expected reference community **for both** multimetric scores and multivariate model scores. The data must be collected following the protocol outlined in the Oregon Watershed Enhancement Board document "Water Quality Monitoring Technical Guide Book. The Oregon Plan for Salmon and Watersheds, July 1999." This document is available at:

http://www.oweb.state.or.us/publications/mon_guide99.shtml

-or-

Data where monitoring methods determined an Index of Biotic Integrity rating of poor or a significant departure from reference conditions utilizing the protocol described in "Section 12 Aquatic Vertebrates" in the Environmental Monitoring and Assessment Program (EMAP) protocols (Peck, D.V., J.M. Lazorchak, and D.J. Klemm (editors). Unpublished draft. 2001. Environmental Monitoring and Assessment Program-Surface Waters: Western Pilot Study Field Operations Manual for Wadeable Streams. EPA/XXX/X-XX/XXXX. U.S. Environmental Protection Agency, Washington D.C. EMAP). This document is available at:

http://www.epa.gov/emap/html/pubs/docs/groupdocs/surfwatr/field/

Sedimentation data:
Excessive sedimentation shall be defined by comparison of reach or stream specific data to percent fines data collected at reference sites as part of the Environmental Monitoring and Assessment Program (EMAP). The data from reference sites has been stratified by ecoregion. The analysis shall be done using the modified Wolman pebble count method described in the EMAP document cited above. In this method a minimum of 100 tallies of the substrate are conducted. The fines are defined as particles with a diameter of less than 2 mm. The distribution of particle sizes is defined by ecoregions (Thorson, T.D., Bryce, S.A., Lammers, D.A., Woods, A.J., Omernik, J.M., Kagan, J., Pater, D.E., and Comstock, J.A. 2003 Ecoregions of Oregon (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000) as available data allows:

Table 6: Percent Fines by Ecoregion

Group	number of reference sites	% fines - 90th percentile
Ecoregion Blue Mountains	10	28
Ecoregion - Cascades	52	14
Ecoregion - Coast Range	31	53
Ecoregion- Klamath	20	22
Ecoregion - E.Cascade Slope	9	55
Ecoregion -Willamette	Insufficient data	

Data for the Willamette ecoregion is not yet available. The data should be available prior to completion of the 2004 303(d) list.

Potential Concern: Two methods are available to place a water body in the potential concern category for sedimentation.

1. To place a water body in the potential concern category, substrate data must be collected following the EMAP protocol cited above. The percentage of the particle distribution that is fines (< 2 mm diameter) must be between the 75th percentile described below and the 90th percentile described in the previous table.

Table 7: Potential Concern Percent Fines

Group	number of reference sites	% fines - 75th percentile
Ecoregion Blue Mountains	10	22
Ecoregion - Cascades	52	9
Ecoregion - Coast Range	31	26
Ecoregion- Klamath	20	7
Ecoregion - E.Cascade Slope	9	45
Ecoregion-Willamette	Insufficient data	

2. Substrate data collected by the Oregon Department of Fish and Wildlife can be compared to indices of anthropogenic sources of sediment. The ODFW data can be viewed at:
http://oregonstate.edu/Dept/ODFW/freshwater/inventory/nworgis.html

An example of such an analysis is below:

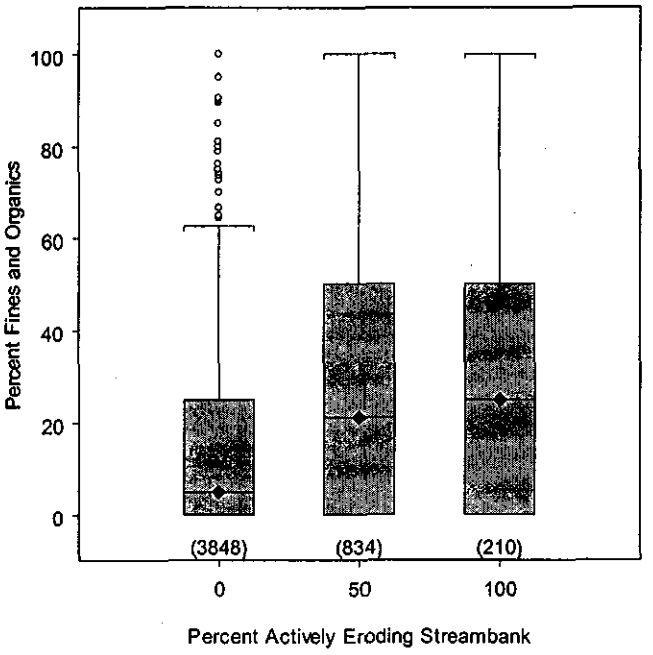


Figure 8: Percent of silt and organics versus percent actively eroding stream bank the surveyed stream in the Wallowa Subbasin. Above data set used the entire Wallowa subbasin and all unit types (i.e. pools through cascades). Sediment data is from the ODFW habitat survey collected between 10/21/1991 and 7/23/1996 in the Wallowa Subbasin.

De-list streams:
To de-list streams data must be collected which demonstrates that the beneficial uses are supported or that sediment (as percent fines) is below reference levels. Specifically, data on aquatic community status must show that the macroinvertebrate community is at least 75% of the expected reference community. Substrate data must be collected following the EMAP protocol referenced above and the percentage of the particle distribution that are fines (< 2 mm diameter) must be less than the 75th percentile of reference site data.

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Data collected since October 1992.

PARAMETER: **Temperature**

BENEFICIAL USES AFFECTED: Resident Fish & Aquatic Life,
Salmonid Fish Spawning & Rearing

NARRATIVE CRITERIA: OAR 340-41-(*basin*)(2)(*b*)

Standards applicable to all basins (adopted 1/11/96, effective 7/1/96):

No measurable surface water increase from anthropogenic activities is allowed when surface water temperatures exceed:

- **64°F (17.8°C)** in basins for which salmonid rearing is a beneficial use;
- **55°F (12.8° C)** during times and in waters that support salmon spawning, egg incubation and fry emergence from the egg and from the gravels;
- **50°F (10°C)** in waters that support Oregon Bull Trout;
- **68°F (20°C)** in the Columbia River (mouth to river mile 309);
- **68°F (20°C)** in the Willamette River (mouth to river mile 50);

[except when the air temperature during the warmest seven-day period of the year exceeds the 90th percentile of the 7-day average daily maximum air temperature calculated in a yearly series over the historic record]

The numeric criteria are measured as the seven (7) day moving average of the daily maximum temperatures. If there is insufficient data to establish a seven – day moving average of the daily maximum temperatures, the numeric criteria shall be applied as an instantaneous maximum (OAR 340-41-0006(54)).

DEQ will use the Bull Trout distribution maps to be created by the Bull Trout workgroup. *This workgroup is identifying the areas where Bull Trout spawn and migrate. Maps of* Bull Trout distribution will be available in April 2003.

Figure 9 describes the temperature data evaluation process.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): Moving seven (7) day average of the daily maximum exceeds the appropriate criterion listed above. Where grab data (non-continuous data) were collected, more than 25 percent (and a minimum of at least two exceedences) of the samples exceed the appropriate criterion based on multi-year monitoring programs that collect representative samples on separate days for the season of concern.

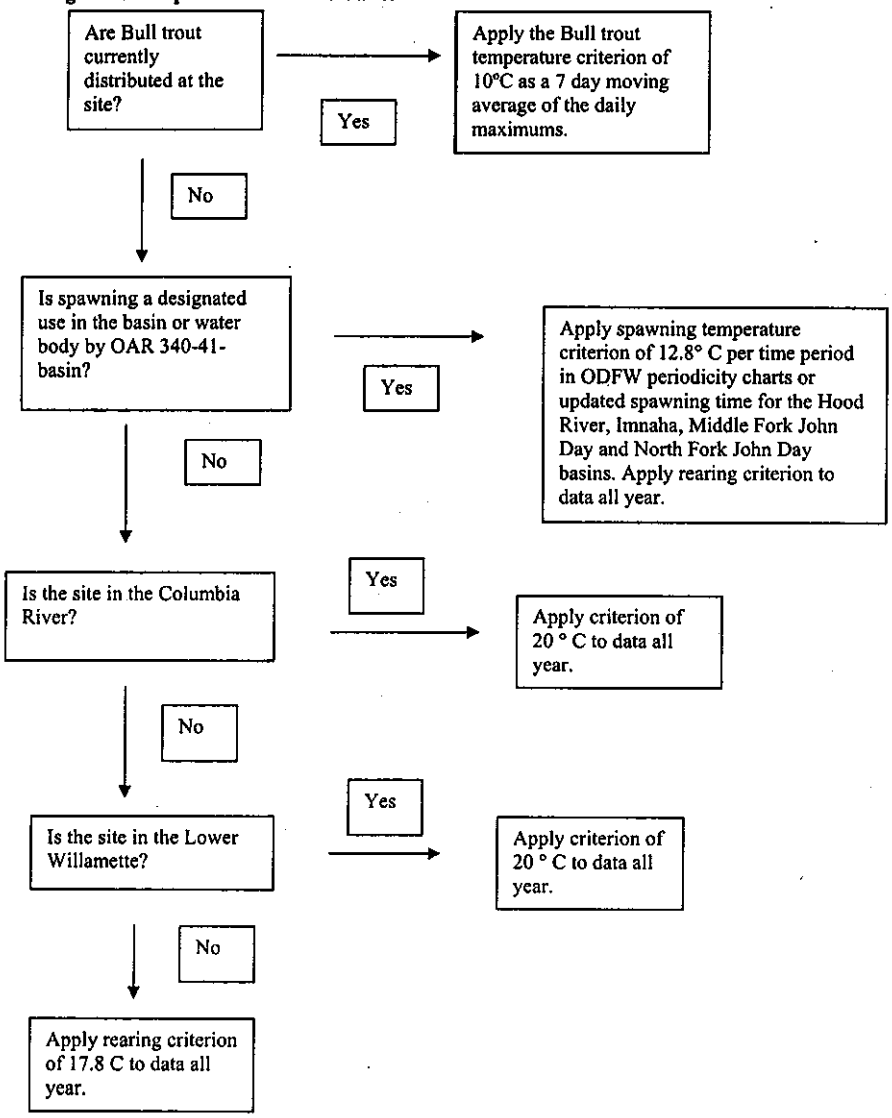
ATTAINING CRITERION (EPA CATEGORY 2): Where continuous data were collected the moving seven (7) day average of the daily maximum attains the appropriate criterion listed above. In locations where grab data were collected, a minimum of five samples must be available. Greater than 90% of the samples must meet the appropriate criterion.

INSUFFICIENT DATA (EPA CATEGORY 3): Where grab data were collected, less than 5 samples are available for the time period of interest. Where continuous data were collected, insufficient data was available to calculate the seven day average of the daily maximums.

TIME PERIOD:
See Table 4 and ODFW periodicity charts.

DATA REQUIREMENTS:
Data collected since October 1990.

Figure 9: Temperature Data Evaluation



PARAMETER: **Total Dissolved Gas**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life

NARRATIVE CRITERION: OAR 340-41-(basin)(2)(n)

NUMERIC CRITERION: OAR 340-41-(basin)(2)(g)

Standards applicable to all basins:

(n) The concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection shall not exceed 110 percent of saturation.

(g) The liberation of dissolved gases, such as carbon dioxide, hydrogen sulfide, or other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such waters shall not be allowed.

Water body Specific:

- Columbia River had an alternate standard for specific periods of time since 1995 to allow additional spill over dams for fish passage

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): More than 10 percent of the samples exceed standard and a minimum of at least two exceedences of the standard or a survey that identified beneficial use impairment due to total dissolved gas such as assessment of fish condition;

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Data collected since October 1992. A minimum of 5 representative data points available per site collected on separate days or a representative survey that includes assessment of fish condition.

PARAMETER: **Toxics**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life, Drinking Water

NUMERIC CRITERIA: OAR 340-41-(basin)(2)(p)(B)

NARRATIVE CRITERIA: OAR 340-41-(basin)(2)(p)(A)

Standards applicable to all basins:

OAR 340-41-445(2)(p)(A): Toxic substances shall not be introduced above natural background levels in the waters of the state in amounts, concentrations, or combinations which may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely affect public health, safety, or welfare; aquatic life; wildlife; or other designated beneficial uses;

OAR 340-41-445(2)(p)(B): Levels of toxic substances shall not exceed the criteria listed in Table 20 which were based on criteria established by EPA and published in Quality Criteria for Water (1986), unless otherwise noted;

OAR 340-41-445(2)(p)(C): . . . Where no published EPA criteria exist for a toxic substance, public health advisories and other published scientific literature may be considered and used, if appropriate, to set guidance values.

Water Column Data Evaluation:
Sample results are compared to criteria contained in Table 20. These criteria can be viewed at:
http://www.deq.state.or.us/wq/wqrules/wqrules.htm

Several of the freshwater criteria in Table 20 are hardness dependent. These criteria are identified in Table 20 with a "+" notation. EPA has developed equations to calculate the criteria as a function of hardness as follows:

Acute:
Criteria maximum concentration (CMC) = $e^{(m_a[\ln(hardness)]+b_a)}$

Chronic:
Criteria chronic concentration (CCC) = $e^{(m_c[\ln(hardness)]+b_c)}$

The variables are defined as follows:

Table 8: Hardness Based Criteria

Metal	m_a	b_a	m_c	b_c
Cadmium	1.128	-3.828	0.7852	-3.490
Chromium	0.819	3.688	0.819	1.561
Copper	0.9422	-1.464	0.8545	-1.465
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	3.3612	0.8460	1.1645
Silver	1.72	-6.520		
Zinc	0.8473	0.8604	0.8473	0.7614

Where hardness was not measured directly, the following equation was used to calculate the hardness value (Standard Methods for the Examination of Water and Wastewater, 20th edition, 1998, American Public Health Association, American Water Works Association, Water Environment Federation):

Hardness, mg equivalent $CaCo_3$/L = 2.497{Ca, mg/L} + 4.1189 {Mg, mg/L)

If hardness was less than 25 mg/L, 25 mg/L was used as the default value. EPA describes the minimum hardness to be used when calculating hardness dependent freshwater metals criteria in 40 CFR Section 131.36(c)(4)(i).

The data are compared to the most stringent criteria applicable. Usually the most stringent criteria are those listed under the section labeled "Concentration in Units per

Liter for Protection of Human Health" in Table 20. The water and fish ingestion criteria apply to all basins where fishing and water supply are listed as beneficial uses.

Most of the "toxics" data reviewed was sampled and analyzed by the US Geological Survey (USGS). The USGS previously used a minimum reporting level or "MRL" when reporting results for inorganic and organic parameters. The MRL is defined by the USGS as "the smallest measured concentration of a substance that can be reliably measured by using a given analytical method" (USGS 1999).[2] The MRL is the "less-than" value reported when an analyte either is not detected or is detected at a concentration less than the MRL.

USGS data is available on their website at:
http://water.usgs.gov/nwis/>

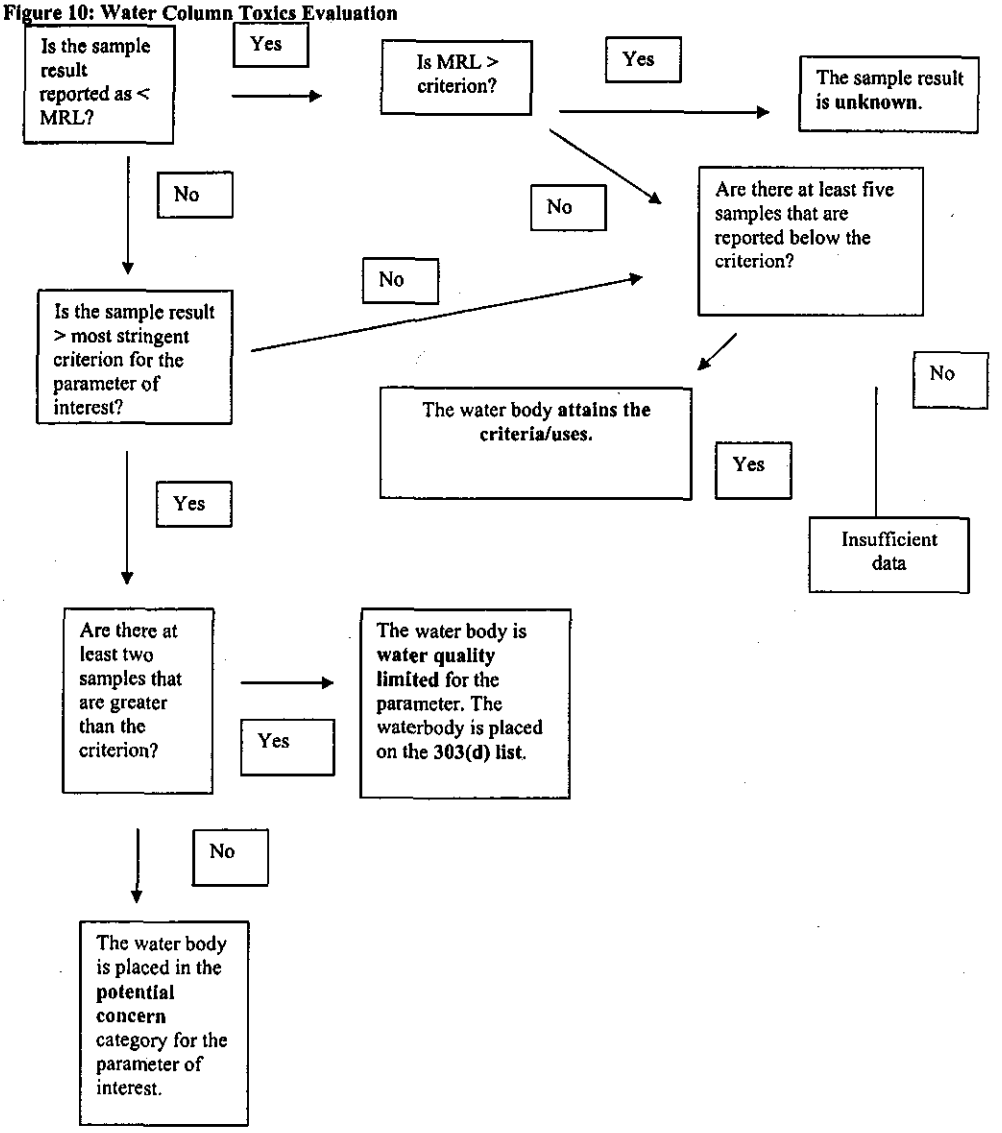
The data is recorded with remark codes in the following categories, where the "less than" value is the MRL:

< Actual value is known to be less than the value shown.
> Actual value is known to be greater than the value shown.

Data will be evaluated according to the following flow chart:

[2] U.S. Geological Survey, "New Reporting Procedures Based on Long Term Method Detection Levels and Some Considerations for Interpretations of Water Quality Data Provided by the US Geological Survey National Water Quality Laboratory", Childress, C.J. et al, 1999, Report 99-193.

Figure 10: Water Column Toxics Evaluation



Fish Tissue Data:

The chemical has been detected in more than 10% of available fish tissue samples, and the mean of the detects exceeds a threshold value derived from EPA water quality criteria. The threshold value is related to the water quality criteria as follows:

Fish Tissue Threshold Value = Table 20 Criteria for Protection of Human Health (ug/l)
* BCF (l/kg) * (mg/1000 ug)

where BCF = Bioconcentration Factor. BCFs were obtained from the EPA Region VIII Criteria Chart (July 1993).

Fish Consumption Advisories:

- A fish or shellfish consumption advisory or recommendation issued by the Health Division specifically refers to this chemical.

Bioassay data:

- The chemical has been found to cause a biological impairment via a field test of significance such as a bioassay. The field test must involve comparison to a reference condition.

Other Methodologies:

- Peer reviewed methodologies used for the determination of contaminant levels in the water column. Contaminant levels are compared directly to Table 20 criteria.

WATER QUALITY LIMITED DETERMINATION (EPA CATEGORY 5): For water column data and bioassay data, a minimum sample set of two, with a minimum of two exceedances of the applicable criteria.

ATTAINING CRITERIA (EPA CATEGORY 2): For water column data, a minimum *sample set of five, with all sample results below the applicable criterion.*

TIME PERIOD: Annual

DATA REQUIREMENTS:
Data collected since October 1992.

PARAMETER: **Turbidity**

BENEFICIAL USES AFFECTED: Resident Fish and Aquatic Life, Water Supply,

Aesthetics

NARRATIVE CRITERION: OAR 340-41-(basin)(2)(c)

Standards applicable to all basins:

No more than ten percent cumulative increase in natural stream turbidities shall be allowed, as measured relative to a control point immediately upstream of the turbidity causing activities.

WATER QUALITY LIMITED CRITERIA: A systematic or persistent increase (of greater than 10%) in turbidity due to an operational activity that occurs on a persistent basis (e.g. dam release or irrigation return, etc).

TIME PERIOD:
Annual

DATA REQUIREMENTS:
Data collected since October 1992 on a frequent enough basis (e.g. daily) to establish a relationship between water quality and a turbidity causing activity.

INTEGRATED REPORT FORMAT:

The Integrated Report consists of the following columns: USGS 4th Field Subbasin, Water body Name, Water body LLID, Beginning and Ending River Mile, Parameter, Beneficial Uses, Criterion, Season, Supporting Data, Listing Status, Assessment Date.

Subbasin: The names are based on the USGS Hydrologic Unit Codes (HUCs) fourth field boundaries.

Water body Name: The name of the water body, utilizing the USGS stream names.

Water body LLID: The unique identifier for each water body.

Beginning and ending river mile: The length of the listing for the water body segment (in miles).

Parameter: Name of water quality parameter being considered.

Beneficial Uses: The beneficial uses the criteria are designed to protect.

Criteria: The narrative or numeric criteria the data are compared to and must meet to be in compliance with the standard.

Season: The time of year when the water quality standard is violated.

Supporting Data: A summary of the data evaluated during the assessment. The river mile of the sampling point(s) is included.

Listing Status:

- Attaining criteria/Uses
- WQL not needing a TMDL
- TMDL Approved
- 303(d) list
- Insufficient or no data
- Potential Concern

Assessment Year: This column identifies the year the assessment took place. Many of the water bodies that are identified with an assessment year of 1998 were actually assessed in 1996.

APPENDIX A

2004 303(d) LIST/DELIST DATA SUBMITTALS MINIMUM DATA REQUIREMENTS

The following quality assurance and quality control (QA/QC) requirements must be met by all data submitted in support of listing or delisting a waterbody segment in the Oregon 2004 303(d) List

- Identify and document precise sampling site location(s). The sampling location must be documented by latitude and longitude in either decimal degrees or degrees, minutes, seconds.

- Document date and time the samples were collected.

  Sampling and analysis must be conducted under a written QA/QC Plan or by established and approved protocols such as contained in the Water Quality Monitoring Technical Guidebook, The Oregon Plan for Salmon and Watersheds, July 1999. The QA/QC plan must contain the data quality objectives (DQOs).

- Chemistry samples must be analyzed in accordance with methods cited in the most recent edition of *Standard Methods for the Examination of Water and Waste Water,* or using EPA approved methods listed in the most recent update of 40 CFR 136. The analysis must utilize appropriate QA/QC protocols, such as routinely analyzing replicates, blanks, laboratory control samples (LCS) and spiked samples. Data using field kits is only acceptable if the kits use a method approved under 40 CFR 136 and the QA/QC protocols referenced above have been adhered to. *(See* DEQ Laboratory Field Sampling Reference Guide, *and* DEQ Laboratory Quality Assurance Manual.)

- Written documentation must be submitted indicating how the data was evaluated to ensure it met the QA/QC objectives including the data quality objectives.

- Samples analyzed must comply with preservation, transportation and holding time recommendations cited in the most recent edition of Standard Methods for the Examination of Water and Waste Water or the DEQ Laboratory Field Sampling Reference Guide".

- Data must be reported in standard units recommended in the relevant approved method.

- Instruments (pH, DO, Conductivity, Temperature, etc.) are to be operated and calibrated according to manufacturer's recommendations, or other acceptable, established procedure. Field measurements must be conducted using methods cited in the most recent edition of Standard Methods for Analysis of Water and Waste Water. For grab samples, duplicate samples will be taken at a minimum of 10% of the total number of monitoring sites (1 duplicate for every 10 sites).

Reference: Water Quality Monitoring Technical Guide Book, The Oregon Plan for Salmon and Watersheds July 1999. Available from Oregon Plan website at: http://www.oweb.state.or.us/publications/mon_guide99.shtml

- Continuous temperature monitoring must follow standardized field protocols. At a minimum, pre and post deployment accuracy checks must be conducted using a NIST (National Institute of Standards and Technology) traceable thermometer. For data to be acceptable it must be bracketed by two acceptable field temperature audits during the deployment period.

Reference: Water Quality Monitoring Technical Guide Book, The Oregon Plan for Salmon and Watersheds July 1999. Available from Oregon Plan website at: http://www.oweb.state.or.us/publications/mon_guide99.shtml

- Multi-parameter continuous monitors must be calibrated following the manufacturer's calibration procedures prior to field deployment. For data to be acceptable it must be bracketed by two acceptable field audits during the deployment period.

- For macroinvertebrate assessments the Level 3 protocol described in the Oregon Plan Water Quality Monitoring Technical Guide Book, must be followed.

References:

Water Quality Monitoring Technical Guide Book, The Oregon Plan for Salmon and Watersheds July 1999. Available from Oregon Plan website at: http://www.oweb.state.or.us/publications/mon_guide99.shtml

DRAFT Reference Condition Approach and Site Selection, DEQ, February 2003.