Watershed Monitoring and Assessment Design Workbook

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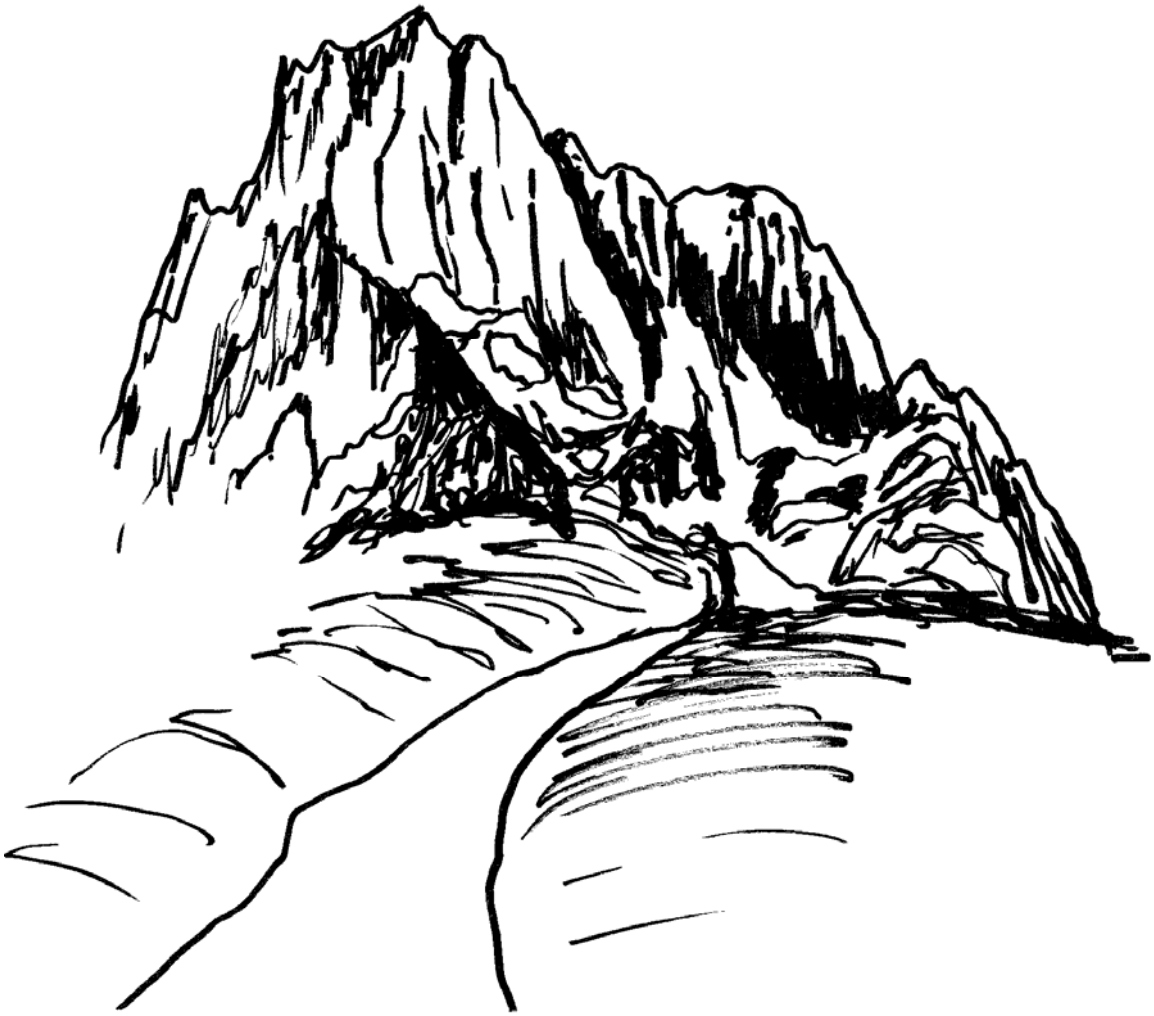

By Barb Horn and Geoff Dates

Funded by United States Environmental Protection Agency, Region VIII

Rocky Mountain Watershed Network Presents:

WATERSHED MONITORING AND ASSESSMENT DESIGN WORKBOOK

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United States Environmental Protection Agency, Region VIII

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Designing a Watershed Assessment Workbook

Clean Water Act, Table of Contents

The RMWN is composed of Colorado, Montana, NewMexico, North Dakota, South Dakota, Utah, and Wyoming.

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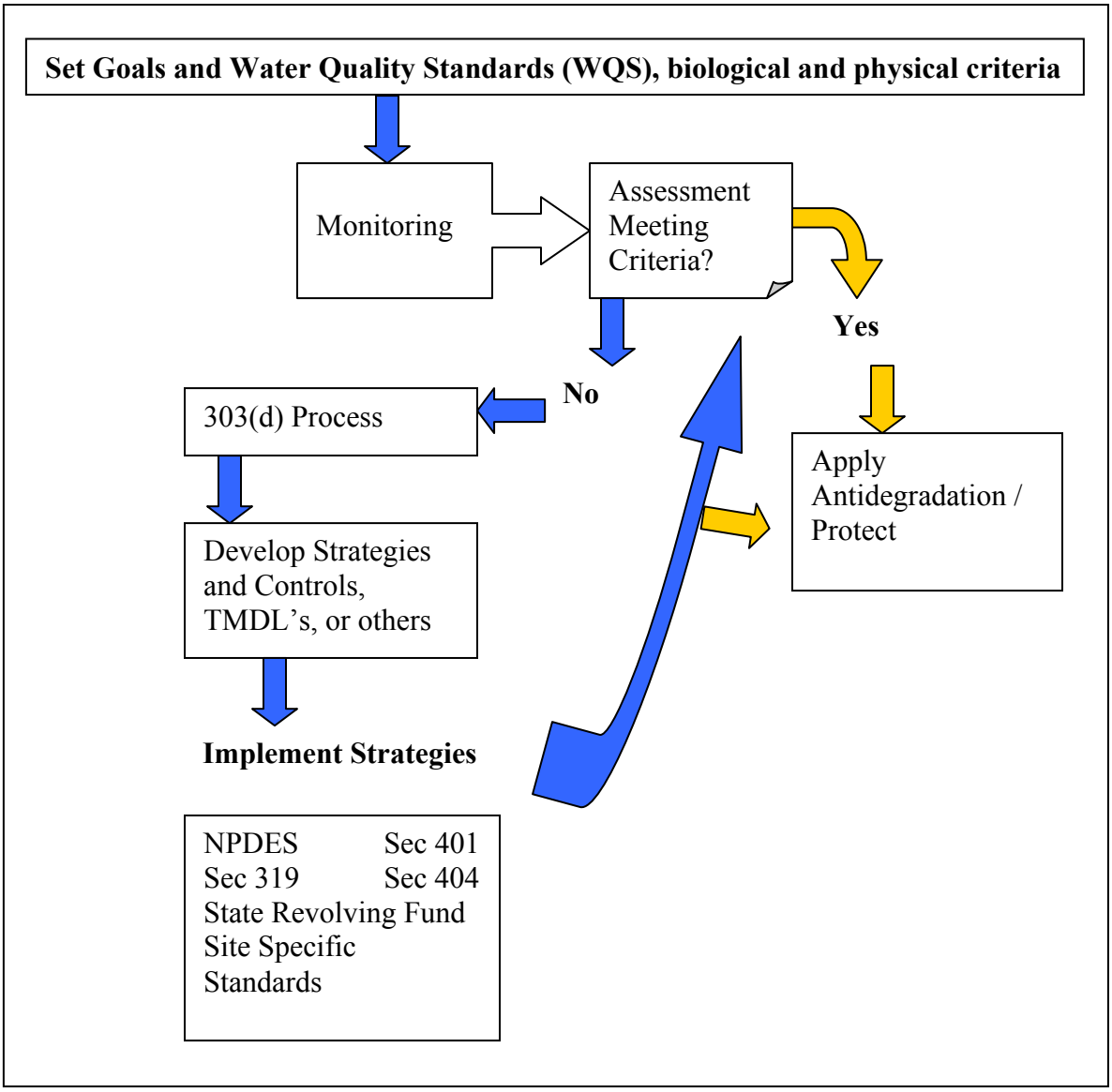
Introduction

The purpose of this Module is to highlight and summarize for each state the specific Clean Water Act information that might be necessary for watershed monitoring and assessment planning. Even if your monitoring purpose is not directly CWA decision processes, many of the methods, sample designs, analytical methods can help design other monitoring purposes. In addition, if your monitoring purpose is the same as CWA decision processes but your decision maker is not the regulators of the CWA process, you can still use their methods and science for your own purpose or decision makers.

It is helpful to understand how your state implements your CWA period. It is also useful to understand how other states implement their CWA relative to your state, especially states who receive water from adjacent states with different standards and the like. We have divided the CWA information into three sections. Each state, CO, WY, UT, MT, NM, SD and ND are covered in each section alphabetically. In addition, for content that was cut/paste from the document, the map to the web site is provided so you can get the most current information.

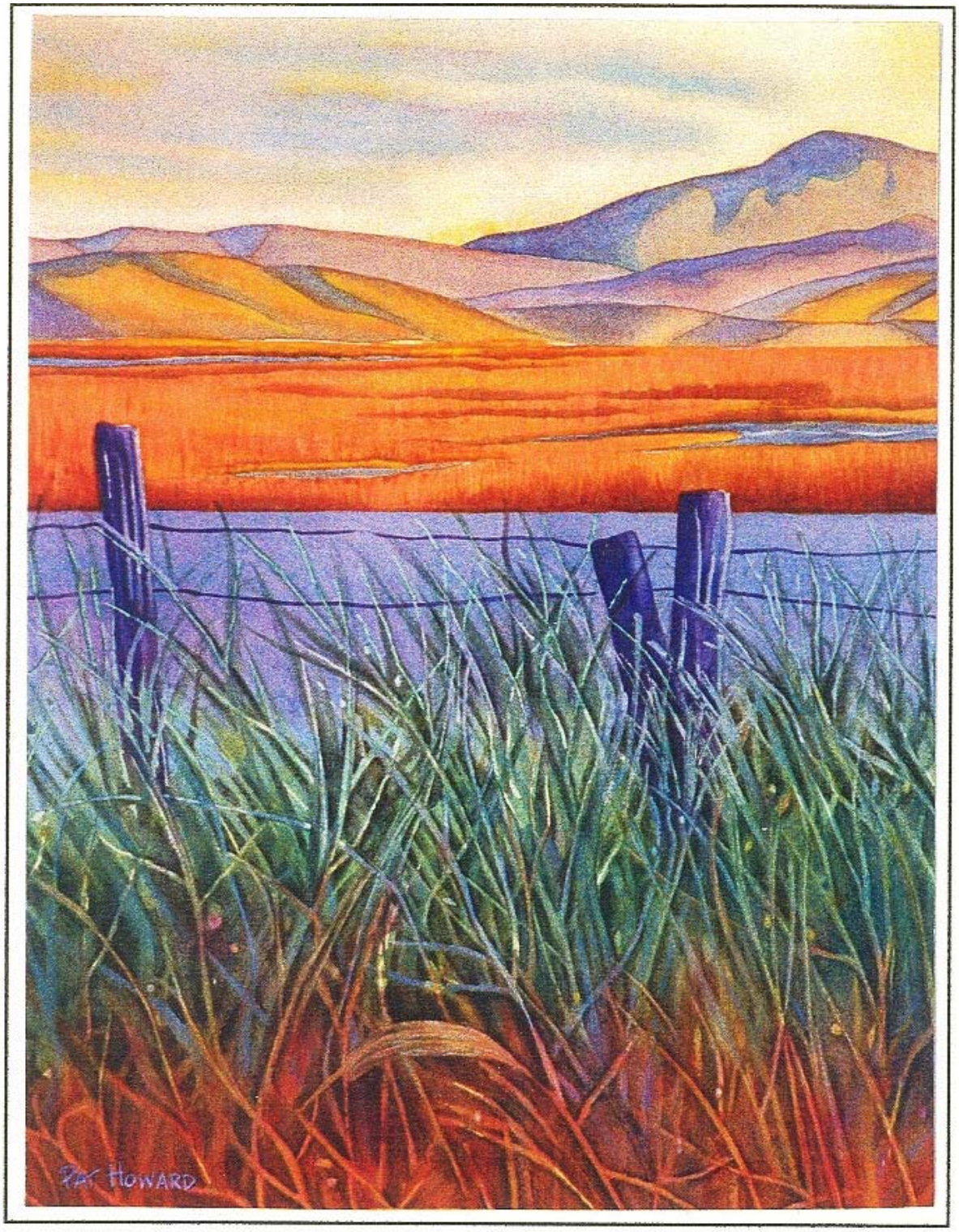
Figure depicting general Clean Water Act Process, set standards and criteria, monitoring, assess from the data and analyses if criteria are being met and uses protected, if answer is yes apply antidegradation to protect, if answer is now, enter 303(d) impaired stream or use process, develop TMDLs or other controls, use strategies and funding sources, once implemented, monitor, assess and if meeting uses/criteria now apply antidegradation or repeat no cycle.



Resources

1. *www.rivernetwork.org*, RiverNetwork's website has a searchable Clean Water Act database for the United States. Searches can be conducted by state as well as topics and key words. The information includes contacts, …
2. *The Clean Water Act An Owner's Manual*, 1999, new edition to be released in 2005, www.rivernetwork.org, an lay men guide to using and understanding the CWA for river protection and restoration efforts.
3. *Watershed Academy web-base training Module on the CWA, titled "the introduction to the CWA"*, http://www.epa.gov/watertrain/cwa. The course provides an introduction to the major CWA programs in the following sequence, or can jump to a particular CWA program:
    - Water quality standards
    - Antidegradation policy
    - Waterbody monitoring and assessment
    - Reports on condition of the nation's water
    - Total maximum daily loads (TMDLs)
    - NPDES Permit program for nonpoint sources
    - Section 319 program support for nonpoint sources
    - Section 404 program regulating filling of wetlands and other waters
    - Section 401 state water quality certification
    - State revolving loan fund (SRF)

Clean Water Act



The Clean Water Act: COLORADO

I) WQCC and State Review Process

The Colorado Water Quality Control Commission is the administrative agency responsible for developing specific state water quality policies, in a manner that implements the broader policies set forth by the Legislature in the Colorado Water Quality Control Act. The Commission adopts water quality classifications and standards for surface and ground waters of the state, as well as various regulations aimed at achieving compliance with those classifications and standards. The Commission encourages the broadest possible public involvement in its rulemaking hearings—where water quality standards and other regulations are formally adopted--and in informal informational hearings on a variety of topics.

The Commission meets the second Monday (and Tuesday, if necessary) of the month to develop and maintain comprehensive programs for the prevention, control and abatement of water pollution and for the protection of water quality in the state. The Commission's nine members are appointed by the Governor for three year terms and confirmed by the Colorado Senate. Members are chosen to "achieve geographical representation" and "reflect the various interests in water in the state." At least two members must be from west of the Continental Divide.

Mission Statement: *To develop and maintain a comprehensive and effective program for the protection of Colorado surface and ground water quality, through an open process that fully involves the public.*

The agenda for each Commission meeting will be published monthly on the Water Quality Control Commission Homepage under Upcoming Commission Meetings and Hearings. The agenda is also included in the monthly Water Quality Information Bulletin which is available at a charge of $40 per year by calling (303) 692-3469. The Bulletin also contains informational hearing notices, summaries of rulemaking hearing notices, the Commission's Long Range Schedule, and other information regarding Commission activities. Notices for rulemaking hearings are published by the Public Records Corporation through the Colorado Register.

Citizens may participate by obtaining "party status", or "mailing list status", or simply by providing written or oral input prior to or at a hearing.

The hearing notice includes a deadline for requesting party status to a hearing. Persons with party status must meet certain prehearing deadlines for the submission of documents. They receive copies of documents from other parties, and at the hearing have the right to cross-examine witnesses. Information for Parties to Rulemaking Hearings is included as Appendix C in the WQCC Handbook or available from the Commission Office.

Requests for "mailing list status" to a hearing are due on the same date as party status requests. Mailing list status allows receipt of all party documents (except individual exhibits more than five pages in length) but does not entail a right to cross-examination. Recommendations for Non-Parties for Participation in Rulemaking Hearings is included as Appendix D in the WQCC Handbook or available from the Commission Office.

The State Act provides that the Commission "shall hold a public hearing during the month of October of each year in order to hear public comment on water pollution problems within the state." This hearing is typically held during the evening of the first day of the Commission's regular October meeting. This meeting is part of a triennial review process that is described below.

Although this formal opportunity for public input is scheduled annually, the Commission welcomes public input regarding Colorado water quality issues at any time. The Commission recommends that interested persons contact the Commission's Administrator, Paul Frohardt, at (303) 692-3468, to discuss options for bringing issues to the Commission's attention.

Triennial Review Process:

Section 303(c)(1) of the federal Clean Water Act requires that all states hold public hearings at least once every 3 years for the purpose of reviewing water quality standards and proposing, where appropriate, necessary revisions to water quality standards.

TRIENNIAL AND ROUTINE REVIEWS OF WATER QUALITY CONTROL COMMISSION REGULATIONS

The Water Quality Control Commission is directed by the Colorado Water Quality Control Act to review all (1) water quality classifications and standards and (2) control regulations adopted by the Commission at least once every three years. Somewhat different triennial review processes have been established for these two types of regulations.

For water quality classifications and standards, there are three steps in the triennial review process:

(1) an issues scoping hearing, for early identification of issues that it is expected will need to be addressed in the next major rulemaking hearing;

(2) an issues formulation hearing, to formulate the specific issues that will be addressed in the next major rulemaking hearing; and

(3) a rulemaking hearing, These hearings occur in three consecutive years for each regulation, as set forth in the table below. Colorado does Triennial Reviews on a rotating basin basis, with approximately one fourth of the land area of the state evaluated approximately every year. Although each watershed's evaluation process covers 3 years, each process begins again every five years.

Year	October: Issues Scoping Hearing	November: Issues Formulation Hearing	July: Rulemaking Hearing
2002	South Platte (#38)	Upper Colorado (#33); Lower Colorado (#37)	Arkansas (#32); Rio Grande (#36)
2003	Basic Standards (#31)	South Platte (#38)	Upper Colorado (#33); Lower Colorado (#37)
2004	San Juan (#34); Gunnison (#35)	Basic Standards (#31)	South Platte (#38)

2005	Arkansas (#32); Rio Grande (#36)	San Juan (#34); Gunnison (#35)	Basic Standards (#31)
2006	Upper Colorado (#33); Lower Colorado (#37)	Arkansas (#32); Rio Grande (#36)	San Juan (#34); Gunnison (#35)
2007	South Platte (#38)	Upper Colorado (#33); Lower Colorado (#37)	Arkansas (#32); Rio Grande (#36)
2008	Basic Standards (#31)	South Platte (#38)	Upper Colorado (#33); Lower Colorado (#37)

For control regulations, the Commission begins its periodic review of each regulation with an informational hearing to receive staff and public comment regarding whether the regulation in question should be revised, repealed, or continued in its current form. If it decides as a result of this informational hearing that changes should be considered, a separate rulemaking hearing is scheduled. In addition to meeting this statutory requirement, the Commission has instituted a practice of conducting periodic routine reviews of all of its regulations. Regulations other than water quality classifications and standards and control regulations generally are reviewed at five-year intervals, using a process similar to that for reviewing control regulations.

The following schedules have been established for triennial reviews of water quality classifications and standards and for triennial and routine reviews of control regulations and other regulations adopted by the Commission.

Other Commission Regulations

Regulation	Informational Hearing
Regulation #21 Procedural Rules	June, 2006
Regulation #22 Site Application Regs.	March, 2008
Regulation #23 Continuing Planning Process Reg.	October, 2006
Regulation #39 Colorado River Salinity Standards	December, 2005
Regulation #41 Basic Standards for Ground Water	October, 2003
Regulation #42 Site-Specific Ground Water Stds.	October, 2003
Regulation #51 Revolving Fund Rules	January, 2006
Regulation #53 State Grant Rules	January, 2006

Regulation #6 Discharge Permit Regulations	January, 2007
Regulation #62 Effluent Limitation Regs.	April, 2004
Regulation #63 Pretreatment Regulations	February, 2006
Regulation #64 Biosolids Regulation	July, 2005
Regulation #65 Discharges to Storm Sewers	October, 2004
Regulation #71 Dillon Control Regulation	March, 2006
Regulation #72 Cherry Creek Control Regulation	September, 2003
Regulation #73 Chatfield Control Regulation	July, 2004
Regulation #74 Bear Creek Control Regulation	July, 2004
Regulation #75 Cheraw Lake Control Regulation	December, 2003
Regulation #81 Confined Animal Feeding Reg.	April, 2006
Regulation #82 401 Certification Reg.	September, 2004
Regulation #83 Passive Mine Drainage Reg.	September, 2003
Regulation #84 Reclaimed Domestic Wastewater Control Regulation	October, 2003

For additional information, contact Diana Glaser at 303-692-3469 or Paul Frohardt at 303-692-3468.

II) Contacts

Mailing address
Colorado Department of Public Health and Environment
OED-OPPI-A5
4300 Cherry Creek Drive South
Denver, CO 80246-1530

General information
Phone: (303)692-3469
Fax: (303)691-7702
E-mail address: diana.glaser@state.co.us

Water Quality Standards
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National Permit Elimination Discharge System (NPDES)
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Total Maximum Daily Loads (TMDLs)
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philip.hegeman@state.co.us

Section 401
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(303) 692-3530
FAX: (303) 782-0390
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Surface Water Quality Assesor
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4300 Cherry Creek Dr. South
Denver, CO 80246-1530
(303) 692-3540
FAX: (303) 782-0390

To get on an agency's mailing list for:

Proposed Water Quality Rule Changes
Loralee Evans
(303) 692-3601

NPDES Permits

Loralee Evans
(303) 692-3601
-Colorado is delegated permit authority (Not EPA)

Triennial Review Hearings
Loralee Evans
(303) 692-3601

III) List of Designated Uses

Waters are designated according to their uses for which they are presently suitable or intended to be suitable. Designations may be established for any state surface waters, except water in ditches and other man-made conveyances

1) Aquatic Life Cold 1 These are waters that (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species.

2) Aquatic Life Cold 2 These are waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species

3) Aquatic Life Warm 1 These are waters that (1) currently are capable of sustaining a wide variety of warm water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows, or levels, abundance and diversity of species.

4) Aquatic Life Warm 2 These are waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species

5) Domestic Water Supply These surface waters are suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent) these waters will meet Colorado drinking water regulations and any revision, amendments, or supplements thereto.

6) Recreation – Class 1 These surface waters are suitable or intended to become suitable for recreational activities in or on the water when the ingestion of small quantities of water is likely to occur. Such waters include but are not limited to those used for swimming, rafting, kayaking, tubing, windsurfing, and water-skiing. Waters shall be presumed to be suitable for Class 1 uses and shall be assigned a class 1a or class 1b classification unless a use attainability analysis

demonstrates that there is not a reasonable potential for primary contact uses to occur in the water segment(s) in question within the next 20-year period

6.a. Class 1a – Existing Primary Contact Class 1a waters are those in which primary contact uses have been documented or are presumed to be present. Waters for which no use attainability analysis has been performed demonstrating that a recreation class 2 classification is appropriate shall be assigned a class 1a classification, unless a reasonable level of inquiry has failed to identify any existing class 1 uses of the water segment.

6.b. Class 1b – Potential Primary Contact This classification shall be assigned to water segments for which no use attainability analysis has been performed demonstrating that a recreation class 2 classification is appropriate, if a reasonable level of inquiry has failed to identify any existing class 1 uses of the water segment.

7) Recreation - Class 2 - Secondary Contact These surface waters are not suitable or intended to become suitable for primary contact recreation uses, but are suitable or intended to become suitable for recreational uses on or about the water which are not included in the primary contact subcategory, including but not limited to wading, fishing, and other streamside or lakeside recreation.

8) Agriculture These surface waters are suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock.

For the criteria for level of use attainment see Appendix A

IV) Water Quality Classified Uses and Antidegradation Policy

Colorado has three levels (tiers) of protection based on the past and current water quality of a section. These three classified uses are Outstanding Waters, Reviewable Waters, and Use-Protected, which are described in a separate document entitled "Antidegradation Policies by State." Water quality standards are determined for water segments as explained in the following text. If all WQS are met, then antidegradation policies and programs are employed to keep the water quality at acceptable levels. For Colorado's Antidegradation Policy see the document entitled "Antidegradation Policies by State."

V) Basic Standards / Criteria

Definitions

"ACUTE STANDARD" means the level not to be exceeded by the concentration in a single sample or calculated as an average of all samples collected during a one-day period. The acute standard is implemented in combination with a selected duration and frequency of recurrence (section 31.9(1)).

"CHRONIC STANDARD" means the level not to be exceeded by the concentration for either a single representative sample or calculated as an average of all samples collected during a thirty-day period. The chronic standard is implemented in combination with a selected duration and frequency of recurrence (section 31.9(1)).

Standards are initiated by the WQCC, and may be narrative and/or numeric. Such standards may include:

1) Basic Standards

All surface waters of the state are subject to the following basic standards; however, discharge of substances regulated by permits which are within those permit limitations shall not be a basis for enforcement proceedings under these basic standards:

a) Except where authorized by permits, BMP's, 401 certifications, or plans of operation approved by the Division or other applicable agencies, state surface waters shall be free from substances attributable to human-caused point source or nonpoint source discharge in amounts, concentrations or combinations which:

   i) for all surface waters except wetlands;

      (1) can settle to form bottom deposits detrimental to the beneficial uses. Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludges, mine slurry or tailings, silt, or mud; or

      (2) form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or

      (3) produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or

      (4) are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or

      (5) produce a predominance of undesirable aquatic life; or

      (6) cause a film on the surface or produce a deposit on shorelines; and

   ii) for surface waters in wetlands;

      (1) produce color, odor, changes in pH, or other conditions in such a degree as to create a nuisance or harm water quality dependent functions or impart any undesirable taste to significant edible aquatic species of the wetland; or

      (2) are toxic to humans, animals, plants, or aquatic life of the wetland.

b) The radioactive materials in surface waters shall be maintained at the lowest practical level. In no case shall radioactive materials in surface waters be increased by any cause attributable to municipal, industrial, or agricultural

practices or discharges to as to exceed the following levels, unless alternative site-specific standards have been adopted pursuant to subsection (4) below:

	Parameter	Picocuries per Liter
(a)	Americium 241	0.15
(b)	Cesium 134	80
(c)	Plutonium 239, and 240	0.15
(d)	Radium 226 and 228	5
(e)	Strontium 90	8
(f)	Thorium 230 and 232	60
(g)	Tritium	20,000

c) The interim organic pollutant standards contained in the following Basic Standards for Organic Chemicals Table are applicable to all surface waters of the state for which the corresponding use classifications have been adopted, unless alternative site-specific standards have been adopted pursuant to sub-section (4) below.

Note that all standards in the Basic Standards for Organic Chemicals Table are being adopted as "interim standards." These interim standards will remain in effect until alternative permanent standards are adopted by the Commission in revisions to this regulation of site-specific standards determinations. Although fully effective with respect to current regulatory applications, these interim standards shall not be considered final or permanent standards subject to antibacksliding or downgrading restrictions.

2) Numeric Standards

A numeric standard may be assigned by the Commission either to apply on a statewide basis or to specific state surface waters. A numeric standard will be assigned by the Commission when it is presented with evidence that a particular numeric level for a parameter is the suitable limit for protecting the classified use. A numeric standard consists of a numeric level and may include a description as to how that numeric level is to be measured. Numeric standards will include appropriate averaging periods and appropriate frequencies of allowed excursions. A numeric standard may be exceeded due to temporary natural conditions such as unusual precipitation patterns, spring runoff or drought. Such uncontrollable conditions are not cause for changing the numeric standard.

A temporary modification of a numeric standard may be granted by the Commission if the numeric standard is not being met at the present time, but such numeric standard is necessary to allow the full attainment of the classified use.

Numeric standards will be assigned based on the evidence presented at the classification and numeric-standard-setting hearings. Numeric standards may not necessarily be assigned for all constituents listed in the tables. In making this determination, the Commission will consider the likelihood of such constituents being present in the waters in question naturally or due to point or non point sources, and shall consider the significance of the constituents with respect to protection of the classified uses

The Commission may use any of the following approaches to establish site-specific numeric standards, as it determines appropriate with respect to specific state surface waters. Existing site-specific standards shall remain in effect until superceded by revised standards promulgated pursuant to this section:

- For Radioactive Material Standards see Regulation #31 – Basic Standards; p28-29
- For Basic Standards for Organic Chemicals see Regulation #31 – Basic Standards; p30-37

a) Table Value Standards

The Commission may apply the numeric levels set forth in tables I, II, and III as site-specific standards when those levels are determined to be appropriate to protect the applicable classified uses, and the available site-specific information does not indicate that one of the following alternative approaches to numeric standards would be more appropriate. Acute and chronic standards may be adopted. Numeric standards may not necessarily be assigned for all constituents listed in the tables. Standards for metals may be established by site-specific adoption of the hardness-dependent equations in table III, instead of single-value numeric standards. The numeric levels for various parameters in tables I, II, and III, are levels determined by the Commission after careful analysis of all available information and are generally considered to protect the beneficial use classifications. They are intended to guide the Commission and others at the use classification and numeric-standard-setting hearings.

- For Physical and Biological Parameters see Appendix B – Table I (DO, pH, Suspended Solids, Temperature, Fecal Coliforms, E.Coli)
- For Inorganic Parameters see Appendix B – Table II (Ammonia, Total Residual Chlorine, Free Cyanide, Fluoride, Nitrate, Nitrite, Sulfide as H_2S, Boron, Chloride, Sulfate, Asbestos)
- For Metal Parameters see Appendix B – Table III (Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium III, Chromium VI, Copper, Iron, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Thallium, Uranium, Zinc)
- For Table Value Standards for Selected Hardnesses see Appendix B – Table IV (Cadmium, Chromium III, Copper, Lead, Manganese, Nickel, Uranium, Zinc)

b) Ambient Quality-Based Standards

For state surface waters where the natural or irreversible man-induced ambient water quality levels are higher than specific numeric levels contained in tables I, II, and III, but are determined adequate to protect classified uses, the Commission may adopt site-specific chronic standards equal to the 85th percentile of the available representative data. Acute standards shall be based on table values or site-specific-criteria-based standards, and in no case may an ambient chronic standard be more lenient than the acute standard.

c) Site-Specific-Criteria-Based Standards

For state surface waters where analysis of an indicator species or other procedures deemed acceptable by the Commission, the Commission may adopt site-specific acute or chronic standards as determined to be appropriate by the study results. For segments assigned aquatic life classifications, where factors other than water quality substantially limit the diversity and abundance of species present, the Commission may adopt site-specific acute or chronic standards as determined to be appropriate based upon available information regarding the waters and the habitat.

Site-specific-criteria-based standards and ambient quality-based standards for metals shall be based on dissolved metals whenever the Commission determines that the evidence presented is adequate to justify such standards. Site-specific standards for metals in effect prior to July 31, 1988 were generally based on total recoverable metals. Those standards shall remain in effect until superceded by revised standards.

d) Narrative standards

Narrative standards may be assigned by the Commission to apply on a specific state surface water where numeric criteria are not required under federal law. Narrative standards will be assigned based on the evidence presented at the classification and numeric-standards-setting hearings, and must protect the classified uses.

The Commission may adopt a site-specific narrative standard where water quality currently is degraded as a result of historical mining activities and improvement is likely within 20 years, if it determines that such a standard is the most appropriate option to protect existing uses and to promote water quality improvement efforts for the segment(s) in question due to uncertainty regarding what water quality is attainable. Unless the Commission determines that a different approach is appropriate on a site-specific basis, it shall use a statement that the standard(s) for the pollutant(s) in question shall be the chemical concentrations, biological conditions, and/or physical conditions identified by a structured scientific use attainability analysis, or table value standards, if the use attainability analysis is not completed and submitted by a specified date and approved by the Commission. Generally, a numerical temporary modification based on existing ambient quality will also be adopted for the segment(s) and pollutant(s) in question.

The Commission may grant a temporary modification if one of the following conditions is shown to exist:

i) where the standard is not being met because of human-induced conditions deemed correctable within a twenty (20) year period, such as:

- nonpoint source pollution which cannot be currently controlled using best management practices (BMP) or point source pollution which cannot be controlled using techniques required by the state and federal Acts but where adequate strategies may become feasible;
- existing dams or other hydrological modifications that may be removed or operated in such a manner as to satisfy the standards;

- deposition of instream toxicants due to past human point or nonpoint source activities which could be removed by natural processes or by human efforts;
- other conditions which are correctable but for which time will be required to implement measures to achieve compliance with the standard.

ii) where the standards cannot be met because the current imposition of the necessary controls or corrective measures would result in a substantial and widespread economic and social impact. The application of this condition requires a judgment by the Commission of what constitutes a substantial and widespread impact warranting modification.

iii) where there is significant uncertainty regarding the appropriate long-term underlying standard -- e.g. due to the need for additional information regarding the extent to which existing quality is the result of natural or irreversible human-induced conditions or regarding the level of water quality necessary to protect current and/or future uses -- and the adoption of a temporary modification recognizes current conditions while providing an opportunity to remove the uncertainty.

VI) Assessment Protocols Used to Determine Standards

The Commission will consider:

1) The need for standards which regulate specified pollutants;

2) Such information as may be available to the Commission as to the degree to which any particular type of pollutant is subject to treatment; the availability, practicality, and technical and economic feasibility of treatment techniques; the impact of treatment requirements upon water quantity; and the extent to which the discharge to be controlled is significant;

3) The continuous, intermittent, or seasonal nature of the pollutant to be controlled;

4) The existing extent of pollution or the maximum extent of pollution to be tolerated as a goal;

5) Whether the pollutant arises from natural sources;

6) Beneficial uses of water; and

7) Such information as may be available to the Commission regarding the risk associated with the pollutants including its persistence, degradability, the usual or potential presence of the affected organism in any waters, the importance of the affected organisms, and the nature and extent of the effect of the pollutant on such organisms.

Testing Procedures

Various testing procedures to determine that numeric values for water quality

parameters may be appropriate to present to the Water Quality Control Commission at stream classification hearings. (See section 31.6(3)). These include:

1) Standard Test Procedures

    a. Code of Federal Regulations, Title 40, Part 136;

    b. The latest approved EPA Methods for Chemical Analysis of Water and Wastes;

    c. Standard Methods for the Examination of Water and Wastewater (current edition), American Public Health Association;

    d. ASTM Standards, Part 31, Water;

    e. EPA Biological Field and Laboratory Methods.

2) Toxicity testing and Criteria Development Procedures:
    a. The latest EPA Methods for Chemical Analysis of Water and Wastewater; ASTM, Standard Methods for Examination of Water, Wastewater;

    b. Interim Guidance on Determination and Use of Water-Effect Ratio for Metals, EPA-823-B-94-001, U.S. Environmental Protection Agency, February, 1994.

    c. Other approved EPA methods.

3) Other Procedures may be deemed appropriate by either the Water Quality Control Commission and/or the Water Quality Control Division.

VII) Stream Segmentation System

For an example of Stream Segmentation with its uses, site-specific standards, table value standards (TVS), and temporary modifications, all based on those uses, see Appendix C. Following is the rationale behind the segmentation system of watersheds in Colorado:

1) For purposes of adopting site-specific classifications and water quality standards, the streams and other surface water bodies shall be identified according to river basin and/or subbasin and specific water segments.

2) Segments may constitute a specified stretch of a river mainstem, a specific tributary, a specific lake or reservoir, or a generally defined grouping of waters within the basin (e.g., a specific mainstem segment and all tributaries flowing into that mainstem segment.

3) Segments shall generally be delineated according to the points at which the use, physical characteristics, or water quality characteristics of a watercourse are determined to change significantly enough to require a change in use classifications and/or water quality standards. In many cases, such transition

> points can be specifically identified from available water quality data. In other cases, however, the delineation of segments shall be based upon best judgments of where instream changes in uses, physical characteristics or water quality occur, based upon upstream and downstream data.

VIII) Treatment of Water Column

The quality of the water column is subject to both narrative and numeric standards as listed above in V) Basic Standards/Criteria and shown in Appendix B. These criteria are applied to sections of watersheds based on their use, as shown in Appendix C.

IX) Treatment of Physical Habitat

Physical habitat is evaluated as either (1) having no substantial impairment of the abundance and diversity of species or (2) conditions that result in substantial impairment of the abundance and diversity of species. These factors along with water flow and water quality are evaluated in determining the Aquatic Life Use Classification.

X) Treatment of Sediment

Colorado's WQCC is currently implementing pilot narrative standards for sediments which may form deposits detrimental to the attainment of aquatic life uses. All surface waters of the state are subject to the basic standards, except for discharge of substances regulated by permits. State surface waters shall be free from substances attributable to human-caused point source or nonpoint source discharge in amounts, concentrations, or combinations which

> "…for all surface waters except wetlands can settle to form bottom deposits detrimental to the beneficial uses."

Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludges, mine slurry of tailings, silt, or mud. This assessment of impacts is intended to apply only to aquatic life in rivers and streams, and is not applied to lakes and reservoirs. Assessment of impacts to other uses or to reservoir and lake systems is not covered in the guidance and would require a site-specific assessment. Guidance to address these other impacts may be provided in the future. The scope of this assessment is limited to bottom deposition of sediment and is not intended to address suspended sediment or turbidity.

The assessment approach is based on the concept of comparing the actual conditions with the expected conditions for each stream segment. Indicators of physical habitat, such as percent fines and substrate embeddedness and indicators of biological condition are measured and a comparison is made between the actual and expected condition.

For further information on sediment assessment and a table showing the narrative sediment standard attainment matrix see Appendix D.

XI) Treatment of Biological

Most biological assessments are performed to evaluate aquatic life use classifications and to support standards development. Biological assessments have occasionally been used to determine attainment of aquatic life uses or attainment of provisional sediment standards. However, chemical information from surface water samples is primarily used to assess use support determinations as reported in the State of Colorado's biennial Status of Water Quality report.

Biologists in the Monitoring Unit are actively developing biocriteria to more effectively utilize biological information as part of the State of Colorado's water quality standards program. Initially, biocriteria will be developed for benthic macroinvertebrates. Over the last four years, biologists in the Monitoring Unit have collected benthic macroinvertebrate samples from approximately 300 potential reference/least impaired sites from all dominant ecoregions within the State of Colorado. This data is currently being evaluated.

Combined with information on physical habitat and water chemistry, this benthic macroinvertebrate data will be used to develop provisional region-specific biocriteria. Once developed, these provisional biocriteria will be evaluated using new benthic macroinvertebrate information, and further refined as needed. It is anticipated that benthic macroinvertebrate biocriteria will be used as an assessment tool to support the water quality standards and classification programs within the State of Colorado. Biocriteria based on fishery information may be developed in the future.

For an overview of Colorado's Biological Assessment, see Appendix E.

XII) Treatment of Wetlands

For information on the Treatment of Wetlands in Colorado, see a separate document entitled "Treatment of Wetlands by State."

XIII) 305b Reports

Section 305(b) of the Clean Water Act requires that states, territories, and jurisdictions assess their water quality biennially and report those findings to the U.S. Environmental Protection Agency (EPA). EPA then summarizes the findings in a national water quality inventory. It is important to note that this report is no longer a Report to Congress, pursuant to Public Law 104-66, the Federal Reports Elimination and Sunset Act of 1995. To assess water quality, states and other jurisdictions compare their monitoring results to the water quality standards they have set for their waters. Water quality standards consist of three elements: the designated uses assigned to waters (such as drinking, swimming, or fishing), criteria to protect those uses (such as chemical-specific thresholds that should not be exceeded), and an antidegradation policy intended to keep waters that *do* meet standards from deteriorating from their current condition.

The latest Colorado 305(b) report was completed in 2002 and can be accessed at http://www.cdphe.state.co.us/op/wqcc/Other/wqresdoc.html

This data is compiled into the National Water Quality Inventory biennially. The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

The 2002 National Water Quality Inventory is the latest report available and can be accessed at *www.epa.gov/305b/2000report/alhi.pdf*

XIV) 303d lists

Section 303(d) of the Clean Water Act requires states to identify those water bodies, which are impaired by one or more pollutants or which are not attaining aquatic use designations due to biological information. Total Maximum Daily Loads ("TMDLs") are required for each listed water body.

The Monitoring and Evaluation List ("M&E List") identifies water bodies where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more factors, such as the representative nature of the data. Water bodies that are impaired but it is unclear whether the cause of impairment is attributable to pollutants as opposed to pollution are also placed on the M&E List. The M&E List contains water bodies that would be reflected in Category 2 or 3 of EPA's Integrated Reporting Guidance.

Waters that are on neither the Section 303(d) List nor the M&E List are either:

- Attaining their uses and standards (EPA's Category 1)
- Have not been fully assessed (EPA's Category 2 or 3)
- Impaired, but do not require a TMDL (EPA's Category 4)

Segments are ordered in both lists by Water Body Identification (WBID) which corresponds to the structure embedded in the various basin-specific standards. The WBID system is the primary way the WQCD identifies and segregates differing water bodies from each other in the State of Colorado. Within the 8-10 character alpha-numeric WBID are included the state, major river basin, minor river basin, and segment number. In Colorado all WBIDs start out with the letters CO. The 3rd and 4th letters signify the major stream basin (i.e. Arkansas, Rio Grande, etc). The 5th and 6th letters signify the minor stream basin (i.e. Upper, Middle, or Lower part, Clear Cr. Etc). The 7th through 10th letters designate the specific segment number. Example: COARUA01a = Colorado, Arkansas Basin, Upper Arkansas Basin Segment # 1a.

For a key to Colorado's WBID's see Appendix F.

The columns in the 303(d) and M&E lists also contain the following information:

- Portion describes the portion of the segment that is impaired or impacted.
- Parameter identifies the assigned classified use and/or specific parameter for which the waterbody does not attain standards

- Basis indicates the reason the segment was included in the list. Most listings are due to non-attainment of one or more parameter-specific numeric standards. Where biological assessment is noted the listing is based upon fish population inventories developed by the Division of Wildlife.
- Priority indicates the proposed priority for TMDL completion as high, medium, or low

For an example of the Colorado 303(d) or M&E list structure, see Appendix G.

For access to the 2002 Colorado 303(d) list see
http://www.cdphe.state.co.us/op/wqcc/Other/wqresdoc.html

The 2002 Colorado 303(d) list contains 95 stream listings and the M&E list contains 157 listings

XV) Assessment protocols for listing and delisting

Listing: Minimum data requirements:

The water quality assessment process depends on sufficient and reliable data. Listing decisions not supported by adequate data are potentially flawed. Waterbodies are included on the 303(d) List based on an evaluation of biological, chemical or physical data demonstrating non-attainment of numeric or narrative standards, or use impairment. The WQCD will consider listing a waterbody based upon consideration of all chemical, physical, or biological information that meets required sampling, analytical, and interpretive protocols. Considerations include a review of the sampling and analytical methods employed. Factors to be considered include analytical detection limits, sample size, spatial and temporal distribution, variability within the data set, and the use of clean methodologies. Representative data of each type will be sought and utilized whenever possible, especially where use impairment is the potential basis for the listing decision. Listing based upon biological or physical data in the absence of accompanying chemical data requires that such information clearly demonstrate use impairment.

Delisting: Minimum Requirements

In general, removal of waterbodies/pollutants from the 303(d) list is subject to requirements similar to those utilized for listing decisions. Delisting is considered appropriate in instances where new information is developed which indicates that water quality standards are being met and/or designated uses attained. Considerations include more recent or more accurate data (in particular, chemical data generated using clean sampling/analytical methodologies), more sophisticated analysis using a calibrated model, identification of deficiencies in the original assessment, or changes in standards, guidance, or policy.

EPA will review and approve, partially approve/disapprove, or disapprove state or territorial 303(d) lists of impaired and threatened waters requiring a TMDL (Category 5). EPA's review and approval of the 303(d) list will be based on a determination that the state's or territory's assessment and listing methodology was used to prepare the list,

that the assessment and listing methodology is scientifically sound, that it is consistent with the state's or territory's water quality standards, and that the state or territory reasonably considered all existing and readily available data and information, and listed all waters not attaining water quality standards. Upon completing its review of the 303(d) list, EPA will send a letter to the state or territory notifying it of full approval, partial approval/disapproval, or disapproval. If the list is partially approved/disapproved, or disapproved, EPA will develop a list for the state or territory. EPA will also provide 30 days for public comment on the EPA developed list.

More detailed documentation of Colorado's Listing and Delisting Assessment Protocol can be found in Appendix H.

XVI) Assessment for National Point Source Discharge Elimination System (NPDES) permits

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

Colorado is a delegated permit authority; permits are obtained from the Colorado Discharge Permit System

XVII) Resources

River Network: http://www.rivernetwork.org/index.cfm

State-by-State Clean Water Act: http://www.rivernetwork.org/cleanwater/cwa_search.asp

National Water Quality Control Council (NWQCC); data comparability and collaboration: http://wi.water.usgs.gov/pmethods/mdcbfs.pdf

NWQCC minimum list of metadata elements: http://wi.water.usgs.gov/pmethods/elements/list.htm

WQCC of CO: http://www.cdphe.state.co.us/op/wqcc/wqcchom.asp

CO Water Quality Standards: http://www.cdphe.state.co.us/op/regs/waterqualityregs.asp

Colorado's Antidegradation Policy: http://www.cdphe.state.co.us/op/wqcc/wqcchom.asp

Colorado's 2002 305(b) report and 2003 303(d) list:
http://www.cdphe.state.co.us/op/wqcc/Other/wqresdoc.html

Colorado's 2002 Annual Report to the Water Quality Control Commission:
http://www.cdphe.state.co.us/op/wqcc/Other/wqccannrep0203.pdf

For a copy of the *National Water Quality Inventory:2000 Report* (EPA-841-R-02-001), visit www.epa.gov/305b/2000report/alhi.pdf or call the EPA's National Service Center for Environmental Publications at 1-800-490-9198

EPA National TMDL home page: This site provides an overview of the national TMDL program with links to pertinent information on state programs. It includes information on TMDL laws and regulations, policies, documents, examples of TMDLs, and more.
www.epa.gov/owow/tmdl

EPA Region 8 TMDL program: This site provides specific information on TMDL programs in EPA Region 8 (Montana, Wyoming, North Dakota, South Dakota, Colorado, and Utah).
www.epa.gov/Region8/water/tmdl/index.html

Adopt Your Watershed: Learn about organizations active in your watershed! Over 4,000 watershed groups are listed. Also includes tools and resources to help new groups get started. Visit EPA's Adopt Your Watershed sit at: www.epa.gov/adopt/

Surf Your Watershed: This site provides multi-level water resource information. Enter your zip code and learn the facts about your watershed and ways you can get involved. Visit EPA's Surf Your Watershed site at:
www.epa.gov/surf

XVIII) Glossary

Acronyms

- BMP's – Best Management Practices
- CDPHE – Colorado Department of Public Health and Environment
- CWA – Clean Water Act
- CWQCA – Colorado Water Quality Control Act
- EPA – Environmental Protection Agency
- M&E LIST – Monitoring and Evaluation List
- NPDES – National Pollutant Discharge Elimination System
- TMDLs – Total Maximum Daily Loads

- TVS – Table Value Standards
- WBID – Water Body Identification
- WQCC – Water Quality Control Commission
- WQCD – Water Quality Control Division
- WQS – Water Quality Standards

Clean Water Act Words (Section 1)

Regular font definition found in state documents, *italic font definitions not directly found in state documents and thus might be different*

- Acute Standards – The level not to be exceeded by the concentration in a single sample or calculated as an average of all samples collected during a one-day period. The acute standard is implemented in combination with a selected duration and frequency of recurrence (section 31.9(1)). *(Biologically acute exposure is usually one that is short in duration, high in concentration and results in mortality).*

- Ambient Quality – Based Standards – For state surface waters where the natural or irreversible man-induced ambient water quality levels are higher than specific numeric levels contained in tables I, II, and III, but are determined adequate to protect classified uses, the Commission may adopt site-specific chronic standards equal to the 85th percentile of the available representative data. Acute standards shall be based on table values or site-specific-criteria-based standards, and in no case may an ambient chronic standard be more lenient than the acute standard.

- Basic Standards – means those standards as established in Colorado Basic Standard Regulation 31.

- Benthic Macroinvertebrates – *organisms that reside the majority of their life cycle on the bottom of running water ecosystems such as rivers. Some benthic taxa are also found in wetland and lake environments. These organism are excellent indicator species, they are easy and cheap to collect and are exposed to pollutants and environment in a variety of life cycles. Some states have biological macroinvertebrate criteria, but Colorado does not at this time.*

- Biological Parameters – *biotic elements, components and characteristics of water ecosystems that usually are the intended audience for Clean Water Act aquatic life designated uses. This could include micro-organisms such as bacteria, macro-organisms such as macroinvertebrates, shrimp, clams and crawdads, invertebrates such as fish, aquatic vegetation in stream (periphyton, algae, diatoms, horse and cattails, etc.) and adjacent to the stream in the riparian or littoral zone).*

- Chronic Standards – The level not to be exceeded by the concentration for either a single representative sample or calculated as an average of all samples collected during a thirty-day period. The chronic standard is implemented in combination with a selected duration and frequency of recurrence (section 31.9(1)). *(Biologically*

chronic exposure is usually one that is long in duration, frequent in occurrence, low in concentration and results in anything effect that impairs a life stage or life function to eventual mortality).

- Clean Water Act – *The national 1972 Legislation that provides the tools and guidelines to protect designated uses of water in our nation. Each state has its own version of this act. The goal of this act is to have all waters of the nation be swimmable and fishable (biological integrity) through its funding, criteria and guidance. Each state has a designated body to implement the CWA; usually it is a department of quality, environment or health. This entity or states can also chose to have the USEPA implement all or aspects of the CWA within that state.*

- Coagulation – *to cause transformation of (liquid or solid for example) into or as if into a soft, semi-solid or solid mass, which might affect fate and transport of pollutants.*

- Filtration – *the act or process of filtering, a porous material through which a liquid or gas is passed to separate the fluid from suspended particles.*

- Flocculation – *having a fluffy or woolly appearance, like a rock in a stream might appear if minerals or substances of flocculated on its surface.*

- Ground Water – are subsurface waters in a zone of saturation which are or can be brought to the surface of the ground or to surface waters through wells, springs, seeps or other discharge areas.

- Inorganic Parameters – *A category of variables that have criteria and are regulated as possible pollutants, in Colorado that includes nutrients (nitrogen and phosphorus), sulfate, chloride, boron, fluoride and the like. See Table II of Colorado Basic Standards.*

- Issues Formulation Hearing – The Issues Formulation Hearing is the second step in a three-step process used by the Water Quality Control Commission for triennial review of water quality classifications and standards in Colorado. This second step in the triennial review process – the Issues Formulation Hearing – results in the identification of the specific issues to be addressed in the next major rulemaking hearing.

- Issues Scoping Hearing – The Issues Scoping Hearing is the first step in a three-step process used by the Water Quality Control Commission for triennial review of water quality classifications and standards in Colorado. In short, the Issues Scoping Hearing provides an opportunity for early identification of potential issues that may need to be addressed in the next major rulemaking hearing for particular regulations, and for identification of any issues that may need to be addressed in rulemaking prior to that time.

- Mailing List Status – Any person with an intent to participate in the rulemaking process, but not as a party per section 24-4-102(11), C.R.S., may request mailing list status. Such status will allow receipt of all party documents (except individual exhibits more than five pages in length.) The request for mailing list status must be made by the same date party status is due. The request must demonstrate an active interest, intent to participate, and intent to provide written testimony, if any testimony

is given, by the deadline specified in the hearing notice. Approval or disapproval of any mailing list status request shall be made by the Commission's representative at the same time that party status requests are acted on. Prehearing statements and subsequent documents shall be mailed by parties to mailing list status participants. With approval of the Commission representative, a party may be excused from mailing such documents to non-parties if the cost is demonstrated to be burdensome and it is demonstrated that some notice of the availability of such documents at the Commission Office is provided to the mailing list status participants.

- Metal Parameters – *A category of variables that have criteria and are regulated as possible pollutants and referred to as metals on the periodic table. See Table III of Colorado Basic Standards for specific metal criteria.*

- Non Point Source Pollution - *contamination or potential contamination that emanates from a diffuse source, a source that cannot be narrowed to one precise point. All "non-point" sources are voluntarily regulated in comparison to point sources that are regulated under the National and State NPDES permit program.*

- Numeric Standards – The suitable limit (numeric level) of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control Commission.

- Party Status – Unless in its notice of proposed rulemaking issued pursuant to section 21.3(C) of this regulation the Commission specifies otherwise, status as a party as that term is defined in section 24-4-102(11), C.R.S., will be granted in rulemaking proceedings before the Commission. Where an opportunity to obtain party status is provided, it may be obtained in the manner prescribed in the notice issued pursuant to section 21.3(C). The original and 3 copies of each party status request shall be submitted by the deadline established in the notice. Party status shall always be available in proceedings specified in section 21.3(M). Any person requesting a rulemaking hearing shall be granted party status without application therefore. Parties to rulemaking hearings shall have those rights specified in section 21.3(K)(2).

- Physical Parameters – *abiotic elements, components and characteristics of water ecosystems that provide the basis for aquatic life community structure and functional integrity. For example, substrate composition, velocity, discharge, retention time, etc.*

- Point Source Pollution – *contamination or potential contamination that emanates from an identifiable source, such as a pipe or storm drain. All of this "point" sources are regulated under the National and State NPDES permit program.*

- Rulemaking Hearing – The Rulemaking Hearing is the third and final step in a three-step process used by the Water Quality Control Commission for triennial review of water quality classifications and standards in Colorado. The third step is the Rulemaking Hearing, where any revisions to the water quality classifications and standards are formally adopted.

- Sedimentation – *the act or process of depositing sediment, such as on the bottom of a stream or lake bed.*

- Surface Water – *Water that floats on or above the surface of the ground and may or may not be connected with water below the surface or ground water, this includes creeks, streams, rivers, conveyance structures, lakes, reservoirs, ponds and the like. All of these surface waters can be categorized into water body types for management purpose.*

- Table Value Standards – means tables I, II, and III, appended to this regulation, which set forth accepted levels for various parameters which will generally protect the beneficial uses of state surface waters.

- Triennial Review Process – *Federal and Colorado Clean Water Act requires that criteria, designated uses and segmentation are reviewed for each major basin in a three year rotating cycle (hence triennial review). There is a three hearing process for this review an information scoping hearing, an information formulation hearing and then a formal rulemaking hearing. These three hearings take a total of two years to complete. Each calendar year two basins are actively in one of the hearing phases. Every fourth year the basic standards, rules that apply to all basins and segments, often as default criteria are reviewed, thus the reality is that every basin is reviewed every five years.*

- Water Biota – means aquatic life normally found in waters where the summer temperature frequently exceeds 20° C.

- Water Quality Standards – means a narrative and/or numeric restriction established by the Commission applied to state surface waters to protect one or more beneficial uses of such waters. Whenever only numeric or only narrative standards are intended, the wording shall specifically designate which is intended.

- Site Specific Criteria Based Standards – *standards that are developed for a specific location, a segment on a river, a lake or reservoir for example. These standards differ from the basic or default standards and must be based on scientific rationale. See Colorado Basic Standards Regulation #31 for the list of situations that site specific standards can be applied.*

Antidegradation Policy for Colorado CWA (Section 2)

- BAF – Biaccumulation Factor – *a site specific, species specific, pollutant specific organism tissue criteria, design to protect an aquatic community from the affects of a pollutant accumulating in individual organisms or up the food chain to a toxic level.*

- POTWs – Publicly Owned Treatment Works – *often called waste water treatment plants also (WWTP), these plants treat water to a useable level to be use again, sometimes for drinking sometimes not using public funds. They are a point source of pollution and are required to have an NPDES Permit.*

Colorado Wetlands (Section 3)

- Narrative Standards – *The suitable described condition of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control*

Commission. These are more difficult to enforce because they tend not to provide a clear threshold and can contain ambiguous terminology.

- Wetlands - means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

XIX) Appendices

Appendices A through H are referenced the throughout the previous chapters of this document. Sources of the information and the associated websites are listed in chapter XX.

Appendix A
Designated Uses

Table 4: Designated Use Support		
Degree of Designated Use Support	***Water Chemistry Information***	***Physical and Biological Information***
Fully Supporting: Designated uses have been attained and are supported.	The 85th percentile [1] data point is below the applicable chronic stream standard [2]. No exceedances of the acute water quality standard.	Results of physical and biological assessments indicate the use is not impaired.
Not Supporting: At least one designated use is materially impaired.	The **85th perc**entile data point exceeds the chronic water quality standard [2]. Occasional or frequent exceedances of the acute water quality standard.(more than once in three years, or more than 5% of the data points exceed the acute standard.)	Results of physical and biological assessments indicate use impairment.

[1] "Percentile " The values obtained by (m÷n) x 100, where m = the rank of observation in the data set ordered from high (m=n) to low (m=1); and n = the number of data points.

[2] The 50th percentile point is used for metals in the total recoverable form (e.g. Iron).

Appendix B
Basic Standards and Treatment of Water Column

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Acenaphthene	83-32-9	420	420	---[16]	1,700	520
Acrolein	107-02-8	3.5	3.5	9.3	68	21
Acrylamide[C]	79-06-1	0.0078	---	---	---	---
Acrylonitrile[C]	107-13-1	0.065	0.051	0.25	7,500	2,600
Alachlor	15972-60-8	2[M]	2	140	---	---
Aldicarb	116-06-3	7[M]	---	---	---	---
Aldicarb Sulfone	1646-88-4	7[M]	---	---	---	---
Aldicarb Sulfoxide	1646-87-3	7[M]	---	---	---	---
Aldrin[C]	309-00-2	0.0021	$4.9X10^{-5}$	$5.0X10^{-5}$	1.5	---
Aniline[C]	62-53-3	6.1	---	---	---	---
Anthracene (PAH)	120-12-7	2,100	2,100	40,000	---	---
Aramite[C]	140-57-8	1.4	---	---	---	---
Atrazine	1912-24-9	3[M]	---	---	---	---
Azobenzene[C]	103-33-3	0.32	---	---	---	---
Benzene[C, 12]	71-43-2	2.3 to 5[M]	2.2	51	5,300	---
Benzidine[C]	92-87-5	0.00015	$8.6X10^{-5}$	0.00020	2,500	---
Benzo(a)anthracene (PAH)[C]	56-55-3	0.0048	0.0038	0.018	---	---

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Benzo(a)pyrene (PAH)[C, 12]	50-32-8	0.0048 to 0.2[M]	0.0038	0.018	---	---
Benzo(b)fluoranthene (PAH)[C]	205-99-2	0.0048	0.0038	0.018	---	---
Benzo(k)fluoranthene (PAH)[C]	207-08-9	0.0048	0.0038	0.018	---	---
Benzo(g,h,i)perylene (PAH)	191-24-2	---	0.0038	0.018	---	---
Benzotrichloride[C]	98-07-7	0.0027	---	---	---	---
Benzyl chloride[C]	100-44-7	0.21	---	---	---	---
Bis(chloromethyl)ether (BCME)[C]	542-88-1	0.00016	0.0001	0.0003	---	---
Bromate[C]	15541-45-4	0.050	---	---	---	---
Bromodichloromethane (HM)[C]	75-27-4	---	0.55	17	11,000	---
Bromoform (HM)[C]	75-25-2	---	4.3	140	---	---
Butyl benzyl phthalate	85-68-7	1,400	1,400	1,900	---	---
Carbofuran[C, 12]	1563-66-2	35 to 40[M]	---	---	---	---
Carbon tetrachloride[C, 12]	56-23-5	0.27 to 5[M]	0.23	1.6	35,200	---
Chlordane[C, 12]	57-74-9	0.10 to 2[M]	0.00080	0.00081	1.2	0.0043
Chlorethyl ether (BIS-2)[C]	111-44-4	0.032	0.030	0.53	---	---
Chlorobenzene[11]	108-90-7	100[M]	100	1,600	---	---
Chlorodibromomethane (HM)[11]	124-48-1	---	54.0	1,700	---	---

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Chloroform (HM)[C]	67-66-3	---	3.4	110	28,900	1,240
Chloroisopropyl ether(BIS-2)	108-60-1	280	280	65,000	---	---
4-Chloro-3-methylphenol	59-50-7	210	---	---	30	---
Chloronapthalene	91-58-7	560	560	---[10]	2,300	620
Chlorophenol,2-	95-57-8	35	35	150	4,380	2,000
Chlorphrifos	2921-88-2	21	---	---	0.083	0.041
Chrysene (PAH)[C]	218-01-9	0.0048	0.0038	0.018	---	---
DDD[C]	72-54-8	0.15	0.00031	0.00031	0.6	---
DDE[C]	72-55-9	0.1	0.00022	0.00022	1,050	---
DDT[C]	50-29-3	0.1	0.00022	0.00022	0.55	0.001
Dalapon	75-99-0	200[M]	---	---	---	---
Demeton	8065-48-3	---	---	---	---	0.1
Dibenzo(a,h)anthracene (PAH)[C]	53-70-3	0.0048	0.0038	0.018	---	---
1,2 Dibromo-3-Chloropropane (DBCP)[C]	96-12-8	0.2[M]	---	---	---	---
Dichloroacetic acid[C]	79-43-6	0.7	---	—	---	---
Dichlorobenzene 1,2[11]	95-50-1	600[M]	420	1,300	---	---
Dichlorobenzene 1,3	541-73-1	94	94	960	---	---
Dichlorobenzene 1,4[11]	106-46-7	75[M]	63	190	---	---

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Dichlorobenzidine[C]	91-94-1	0.078	0.021	0.028	---	---
Dichloroethane 1,2[C, 12]	107-06-2	0.38 to 5[M]	0.38	37	118,000	20,000
Dichloroethylene 1,1	75-35-4	7[M]	7	3,600	---	---
Dichloroethylene 1,2-cis	156-59-2	70[M]	---	---	---	---
Dichloroethylene 1,2-trans[11]	156-60-5	100[M]	100	10,000	---	---
Dichlorophenol 2,4	120-83-2	21	21	290	2,020	365
Dichlorophenoxyacetic acid (2,4-D)	94-75-7	70[M]	---	---	---	---
Dichloropropane 1,2[C, 12]	78-87-5	0.52 to 5[M]	0.50	14	23,000	5,700
Dichloropropylene 1,3[C]	542-75-6	0.35	0.34	21	6,060	244
Dichlorvos[C]	62-73-7	0.12	---	---	---	---
Dieldrin[C]	60-57-1	0.002	$5.2X10^{-5}$	$5.4X10^{-5}$	0.24	0.056
Diethyl phthalate	84-66-2	5,600	5,600	44,000	---	---
Diisopropylmethylphosphonate (DIMP)	1445-75-6	8	---	---	---	---
Dimethylphenol 2,4	105-67-9	140	140	850	2,120	---
Dimethyl phthalate	131-11-3	70,000	70,000	1,100,000	---	---
Di-n-butyl phthalate	84-74-2	700	700	4,500	---	---
Dinitrophenol 2,4	51-28-5	14	14	5,300	---	---

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Dinitro-o-cresol 4,6	534-52-1	0.27	1.3	28	---	---
Dinitrotoluene 2,4[C]	121-14-2	0.11	0.11	3.4	---	---
Dinitrotoluene 2,6[C]	606-20-2	---	---	---	330	230
Dinoseb	88-85-7	7[M]	---	---	---	---
Dioxane 1,4-	123-91-1	6.1(effective through 3/21/2010)	---	---	---	---
Dioxane 1,4-	123-91-1	3.2(effective 3/22/2010)	---	---	---	---
Dioxin (2,3,7,8 TCDD)[C, 12]	1746-01-6	2.2×10^{-7} to 3.0×10^{-5}, [M]	5.0×10^{-9}	5.1×10^{-9}	0.01	0.00001
Diphenylhydrazine 1,2[C]	122-66-7	0.044	0.036	0.20	270	---
Di(2-ethylhexyl)adipate	103-23-1	400[M]	---	---	---	---
Diquat[12]	85-00-7	15 to 20[M]	---	---	---	---
Endosulfan	115-29-7	42	---[10]	---	0.11	0.056
Endosulfan, alpha	959-98-8	42	---[10]	---	0.11	0.056
Endosulfan, beta	33213-65-9	42	---[10]	---	0.11	0.056
Endosulfan sulfate	1031-07-8	42	---[10]	---	0.11	0.056
Endothall	145-73-3	100[M]	---	---	---	---
Endrin	72-20-8	2[M]	----[10]	---	0.086	0.036

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Endrin aldehyde	7421-93-4	2.1	0.29	0.30	---	---
Epichlorohydrin[C]	106-89-8	3.5	---	---	---	---
Ethylbenzene[11]	100-41-4	700[M]	530	2,100	32,000	---
Ethylene dibromide[C, 12]	106-93-4	0.00041 to 0.05[M]	---	---	---	---
Ethylhexyl phthalate (BIS-2)[C, 12]	117-81-7	2.5 to 6[M]	1.2	2.2	---	---
Fluoranthene (PAH)	206-44-0	280	130	140	3,980	---
Fluorene (PAH)	86-73-7	280	1,100	5,300	---	---
Folpet[C]	133-07-3	10	---	---	---	---
Furmecyclox[C]	60568-05-0	1.2	---	---	---	---
Glyphosate	1071-83-6	700[M]	---	---	---	---
Guthion	86-50-0	---	---	---	---	0.01
Heptachlor[C, 12]	76-44-8	0.008 to 0.4[M]	7.8×10^{-5}	7.9×10^{-5}	0.52	0.0038
Heptachlor epoxide[C, 12]	1024-57-3	0.004 to 0.2[M]	3.9×10^{-5}	3.9×10^{-5}	0.52	0.0038
Hexachlorobenzene[C, 12]	118-74-1	0.022 to 1.0[M]	0.00028	0.00029	---	---
Hexachlorobutadiene	87-68-3	0.45	0.44	---[10]	90	9.3
Hexachlorocyclohexane, Alpha[C]	319-84-6	0.0056	0.0026	0.0049	---	---

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Hexachlorocyclohexane, Beta	319-85-7	0.019	0.0091	0.017	---	---
Hexachlorocyclohexane, Gamma (Lindane)	58-89-9	0.2[M]	0.2	---[10]	0.95	0.08
Hexachlorocyclohexane, Technical[C]	608-73-1	---	0.012	0.041	100	---
Hexachlorocyclopentadiene[11, 12] (HCCPD)	77-47-4	42 to 50[M]	40	---[10]	7	5
Hexachlorodibenzo-p-dioxin (1,2,3,7,8,9-hcdd)[C]	19408-74-3	5.60E-06	---	---	---	---
Hexachloroethane[11]	67-72-1	0.7	0.4	0.92	980	540
Hydrazine/Hydrazine sulfate[C]	302-01-2	0.012	---	---	---	---
Indeno(1,2,3-cd)pyrene (PAH)[C]	193-39-5	0.0048	0.0038	0.018	---	---
Isophorone[11]	78-59-1	140	130	3,600	---	---
Malathion	121-75-5	140	---	---	---	0.1
Methoxychlor[12]	72-43-5	35 to 40[M]	---[10]	---	---	0.03
Methyl bromide (HM)	74-83-9	---	9.8	1,500	---	---
Methyl chloride (HM)[C]	74-87-3	---	5.6	180	---	---
4,4-Methylene bis (N,N'-dimethyl)aniline[C]	101-61-1	0.76	---	---	---	---
Methylene chloride[C, 12]	75-09-2	4.7 to 5[M]	4.6	590	---	---
Mirex	2385-85-5	1.4	---	---	---	0.001

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Naphthalene (PAH)	91-20-3	140	140	---[10]	2,300	620
Nitrobenzene	98-95-3	3.5	3.5	690	27,000	---
Nitrophenol 4	100-02-7	56	56	9,700	---	---
Nitrosodibutylamine N[C]	924-16-3	0.0065	0.0043	0.012	---	---
Nitrosodiethylamine N[C]	55-18-5	0.00023	0.00023	0.0083	---	---
Nitrosodimethylamine N[C]	62-75-9	0.00069	0.00069	3.0	---	---
N-Nitrosodiethanolamine[C]	1116-54-7	0.013	---	---	---	---
Nitrosodiphenylamine N[C]	86-30-6	7.1	3.3	6.0	---	---
N-Nitroso-N-methylethylamine[C]	10595-95-6	0.0016	---	---	---	---
Nitrosopyrrolidine N[C]	930-55-2	0.017	0.016	36	---	---
N-Nitrosodi-n-propylamine[C]	621-64-7	0.005	0.005	0.50	---	---
Oxamyl (vydate)[12]	23135-22-0	175 to 200[M]	---	---	---	---
PCBs[C, 9, 12]	1336-36-3	0.0175 to 0.5[M]	$6.4X10^{-5}$	$6.4X10^{-5}$	2.0	0.014
Parathion	56-38-2	---	---	---	0.065	0.013
Pentachlorobenzene	608-93-5	5.6	1.4	1.5	---	---
Pentachlorophenol[C, 12]	87-86-5	0.29 to 1.0[M]	0.27	3.0	19[6]	15[6]
Phenol	108-95-2	2,100	2,100	---[10]	10,200	2,560

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Picloram	1918-02-1	490	---	---	---	---
Propylene oxide[C]	75-56-9	0.15	---	---	---	---
Pyrene (PAH)	129-00-0	210	210	4,000	---	---
Quinoline[C]	91-22-5	0.012	---	---	---	---
Simazine	122-34-9	4[M]	---	---	---	---
Styrene	100-42-5	100[M]	---	---	---	---
Tetrachlorobenzene 1,2,4,5-	95-94-3	2.1	0.97	1.07	---	---
Tetrachloroethane 1,1,2,2[C]	79-34-5	0.18	0.17	4	---	2,400
Tetrachloroethylene (PCE)	127-18-4	5[M]	0.69	3.3	5,280	840
Toluene[11]	108-88-3	1,000[M]	1,000	15,000	17,500	---
Toxaphene[C, 12]	8001-35-2	0.032 to 3[M]	0.00028	---[10]	0.73	0.0002
Trichlorobenzene 1,2,4-[11]	120-82-1	70[M]	35	---[10]	250	50
Trichloroethane 1,1,1 (1,1,1-TCA)	71-55-6	200[M]	---	---	---	---
Trichloroethane 1,1,2 (1,1,2-TCA)[11, 12]	79-00-5	2.8 to 5[M]	2.7	71	9,400	---
Trichloroethylene (TCE)	79-01-6	5[M]	2.5	30	45,000	21,900

BASIC STANDARDS FOR ORGANIC CHEMICALS (in micrograms per liter)						
Parameter		Human Health Based[1]			Aquatic Life Based[4]	
	CAS No.	Water Supply[2]	Water+Fish[3]	Fish Ingestion[8]	Acute	Chronic
Trichlorophenol 2,4,5	95-95-4	700	700	3,600	---	---
Trichlorophenol 2,4,6[C]	88-06-2	3.2	1.4	2.4	---	970
Trichlorophenoxypropionic acid (2,4,5-tp)	93-72-1	50[M]	---	---	---	---
Trihalomethanes	(total)[7]	80	80	---	---	---
Vinyl Chloride[C, 12]	75-01-4	0.023 to 2[M]	0.023	2.3	---	---
Xylenes (total)[12]	1330-20-7	1,400 to 10,000[M]	---	---	---	---

1 All standards are chronic or 30-day standards. They are based on information contained in EPA's Integrated Risk Information System (IRIS) and/or EPA lifetime health advisories for drinking water using a 10^{-6} incremental risk factor unless otherwise noted.

2 Only applicable to segments classified for water supply.

3 Applicable to all Class 1 aquatic life segments which also have a water supply classification or Class 2 aquatic life segments which also have a water supply classification designated by the Commission after rulemaking hearing. These class 2 segments will generally be those where fish of a catchable size and which are normally consumed are present, and where there is evidence that fishing takes place on a recurring basis. The Commission may also consider additional evidence that may be relevant to a determination whether the conditions applicable to a particular segment are similar enough to the assumptions underlying the water plus fish ingestion criteria to warrant the adoption of water plus fish ingestion standards for the segment in question.

4 Applicable to all aquatic life segments.

5 PQL's for the constituents listed above can be found at section 61.8((2)(I) of the Regulations for the State Discharge Permit System.

6 Standards are pH dependent. Those listed are calculated for pH = 7.8.
Acute = $e^{[1.005(pH)-4.869]}$; Chronic = $e^{[1.005(pH)-5.134]}$.

7 Total trihalomethanes are considered the sum of the concentrations of bromodichloromethane (CAS No. 75-27-4), dibromochloromethane (Chlorodibromomethane(HM), CAS No. 124-48-1), tribromomethane (bromoform, CAS No. 75-25-2) and trichloromethane (chloroform, CAS No. 67-66-3).

8 Applicable to the following segments which do not have a water supply classification: all Class 1 aquatic life segments or Class 2 aquatic life segments designated by the Commission after rulemaking hearing. These class 2 segments will generally be those where fish of a catchable size and which are normally consumed are present, and where there is evidence that fishing takes place on a recurring basis. The Commission may also consider additional evidence that may be relevant to a determination whether the conditions applicable to a particular segment are similar enough to the assumptions underlying the fish ingestion criteria to warrant the adoption of fish ingestion standards for the segment in question.

9 PCBs are a class of chemicals which include aroclors, 1242, 1254, 1221, 1232, 1248,1260 and 1016, CAS numbers 53469-21-9, 11097-69-1, 11104-28-2, 11141-16-5, 12672-29-6, 11096-82-5, and 12674-11-2 respectively. The aquatic life criteria apply to this set of PCBs. The human health criteria apply to total PCBs, i.e. the sum of all congenor or all isomer analyses.

10 The chronic aquatic life standard is more stringent than the associated Water+Fish or Fish Ingestion standard, and therefore no Water+Fish or Fish Ingestion standard has been adopted. 37

11 The Water+Fish and Fish Ingestions standards for these compounds have been calculated using a relative source contribution (RSC).

12 Whenever a range of standards is listed and referenced to this footnote, the first number in the range is a strictly health-based value, based on the Commission's established methodology for human health-based standards. The second number in the range is a maximum contaminant level, established under the federal Safe Drinking Water Act that has been determined to be an acceptable level of this chemical in public water supplies, taking treatability and laboratory detection limits into account. Control requirements, such as discharge permit effluent limitations, shall be established using the first number in the range as the ambient water quality target, provided that no effluent limitation shall require an "end-of-pipe" discharge level more restrictive than the second number in the range. Water bodies will be considered in attainment of this standard, and not included on the Section 303(d) List, so long as the existing ambient quality does not exceed the second number in the range.

C Carcinogens classified by the EPA as A, B1, or B2.

M Drinking water MCL.

CAS No. - Chemical Abstracts Service Registry Number.

(HM) – Halomethanes

(PAH) - Polynuclear Aromatic Hydrocarbons.

(4) Site-Specific Radioactive Materials and Organic Pollutants Standards.

(a) In determining whether to adopt site-specific standards to apply in lieu of the statewide standards established in sections (2) and (3) above, the Commission shall first determine the appropriate use classifications, in accordance with section 31.13. If such a determination would result in removing an existing classification, the downgrading factors in section 31.6 (2)(B) shall apply.

(b) The Commission shall then determine whether numerical standards other than some or all of the statewide standards established in sections (2) and (3) above would be more appropriate for protection of the classified uses, taking into account the factors prescribed in section 25-8-204(4), C.R.S. and in section 31.7. The downgrading factors described in section 31.6(2)(B) shall not apply to the establishment of site-specific standards under this section.

(c) Site-specific standards to apply in lieu of statewide standards may be based upon consideration of the appropriateness of the assumptions used in the risk assessment based potency factors and reference dose values, including, but not limited to, consideration of the uncertainty factor, exposure assessment, bioaccumulation factor, exposed population factor, assumed consumption factor, risk comparisons, uncertainty analysis, and the availability of the toxics in the water column, considering persistence, hardness, pH, temperature or valence form in the water column.

(5) Nothing in this regulation shall be interpreted to preclude: 38

(a) An agency responsible for implementation of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 et seq., as amended, from selecting a remedial action that is more or less stringent than would be achieved by compliance with the statewide numerical standards established in this section, or alternative site-specific standards adopted by the commission, where a determination is made that such a variation is authorized pursuant to the applicable provisions of CERCLA.

(6) Except where the Commission adopts or has adopted a different standard on a site-specific basis, the less restrictive of the following two options shall apply as numerical standards for all surface waters with a “water supply” classification, if water supply is an actual use of the waters in question or of hydrologically connected ground water:

i. existing quality as of January 1, 2000; or

ii. the following table value criteria set forth in Tables II and III:

Iron 300 ug/l (dissolved)
Manganese 50 ug/l (dissolved)
Sulfate 250 mg/l

Provided, that if the existing quality of these constituents in such surface waters as of January 1, 2000, is affected by an unauthorized discharge with respect to which the Division has undertaken an enforcement action, the numerical standards shall be the ambient conditions existing prior to the unauthorized discharge or the above table value criteria, whichever is less restrictive.
Data generated subsequent to January 1, 2000 shall be presumed to be representative of existing quality as of January 1, 2000, if the available information indicates that there have been no new or increased sources of these pollutants impacting the segment(s) in question subsequent to that date.

For all surface waters with a “water supply” classification that are not in actual use as a watersupply, the water supply table value criteria for sulfate, iron and manganese set forth in Tables II and III may be applied as numerical standards only if the Commission determines as the result of a site-specific rulemaking hearing that such standards are necessary and appropriate in accordance with section 31.7.

TABLE I PHYSICAL AND BIOLOGICAL PARAMETERS								
PARAMETER	RECREATIONAL			AQUATIC LIFE			AGRICULTURE	DOMESTIC WATER SUPPLY
	CLASS 1a EXISTING PRIMARY CONTACT	CLASS 1b POTENTIAL PRIMARY CONTACT	CLASS SECONDARY CONTACT	CLASS 1 COLD WATER BIOTA	CLASS 1 WARM WATER BIOTA	CLASS 2		
PHYSICAL								
D.O. (mg/l)[1][8]	3.0(A)		3.0(A)	6.0[2](G) 7.0(spawning)	5.0(A)		3.0(A)	3.0(A)
pH (Std. Units)[3]	6.5–9.0 (Bm)			6.5–9.0(A)	6.5–9.0(A)			5.0–9.0(A)
Suspended Solids[4]								
Temperature (°C)				Max 20 °C, with 3 °C Increase [5](G)	Max 30°C, with 3 C Increase (5)(G)			
BIOLOGICAL:								
								2000(E)
Fecal Coliforms per 100 ml (Geometric Mean)	200[6](A)	325[6]	2000[6](GM)					
E. Coli per 100 ml	126[6]	205[6]	630[6]					630
Note: Capital letters in parentheses refer to references listed in section 31.16(3); Numbers in parentheses refer to Table 1 footnotes.								

Table I – Footnotes

(1) Standards for dissolved oxygen are 1-day minima, unless specified otherwise. For the purposes of permitting, dissolved oxygen may be modeled for average conditions of temperature and flow for the worst case time period. Where dissolved oxygen levels less than these levels occur naturally, a discharge shall not cause a further reduction in dissolved oxygen in receiving water.

(2) A 7.0 mg/liter standard (minimum), during periods of spawning of cold water fish, shall be set on a case-by-case basis as defined in the NPDES permit for those dischargers whose effluent would affect fish spawning.

(3) The pH standards of 6.5 (or 5.0) and 9.0 are an instantaneous minimum and maximum, respectively to be applied as effluent limits.

(4) Suspended solid levels will be controlled by Effluent Limitation Regulations, Basic Standards, and Best Management Practices (BMP's).

(5) Temperature shall maintain a normal pattern of diurnal and seasonal fluctuations with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deemed deleterious to the resident aquatic life. Generally, a maximum 3 degrees Celsius increase over a minimum of a four-hour period, lasting for 12 hours maximum, is deemed acceptable for discharges fluctuating in volume or temperature. Where temperature increases cannot be maintained within this range using BMP, BATEA and BPWTT control measures, the Division will determine whether the resulting temperature increases preclude an aquatic life classification.

(6) Fecal coliform and E. coli criteria, and resulting standards for individual water segments, are established as indicators of the potential presence of pathogenic organisms. In the 2000 rulemaking hearing, the Commission adopted dual fecal coliform and E. coli criteria in anticipation of a transition from reliance on the former to reliance on the latter indicator. The Commission intends that both indicators will be adopted as standards for individual water segments as these revisions are implemented in upcoming triennial reviews. So long as dual standards are in place for a water segment, the Commission intends that dischargers will have the option of either parameter being used in establishing their effluent limits. For the evaluation of ambient water quality data, e.g. for purposes of section 303(d) listing decisions, in the event of a conflict between fecal coliform and E. coli data, the E. coli data shall govern. Compliance with fecal coliform and/or E. coli standards shall be based on the geometric mean of representative stream samples.

(7) For drinking water with or without disinfection.
The dissolved oxygen criterion is intended to apply to the epilmnion and metalimnion strata of lakes and reservoirs. Dissolved oxygen in the hypolimnion may, due to the natural conditions, be less than the table criteria. No reductions in dissolved oxygen levels due to controllable sources is allowed.
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TABLE II INORGANIC PARAMETERS							
PARAMETER	AQUATIC LIFE					AGRICULTURE	DOMESTIC WATER SUPPLY
	CLASS 1 Cold Water Biota		CLASS 1 Warm Water Biota		CLASS 2		
INORGANICS:							
Ammonia (mg/l as N) (Un-ionized unless otherwise noted)	chronic = 0.02(K) acute = 0.43/FT/FPH/2[4]		chronic = 0.06(K) acute = 0.62/FT/FPH/2[4]		acute: see (1) chronic: Cold = 0.02 Warm = 0.06–0.10[1]		0.5 total[2](K) (30-day)
Total residual Chlorine (mg/l)	0.019 (L) (1-day)	0.011 (L) (30-day)	0.019 (L) (1-day)	0.011 (L) (30-day)			
Cyanide - Free (mg/l)	0.005(H) (1-day)		0.005(H) (1-day)			0.2(G) (1-day)	0.2(B,D[7]) (1-day)
Fluoride (mg/l)							2.0[5](E) (1-day)
Nitrate (mg/l as N)						100(3)(B)	10[5](K) (1-day)
Nitrite (mg/l as N)	TO BE ESTABLISHED ON (5)		A CASE BY CASE BASIS (5)			10(3)(B) (1-day)	1.0(2)[5](K) (1-day)
Sulfide as H2S(mg/l)	0.002 undissociated(A) (30-day)		0.002 undissociated(A) (30-day)				0.05(F) (30-day)
Boron (mg/l)						0.75(A,B) (30-day)	
Chloride (mg/l)							250(F) (30-day)
Sulfate (mg/l)							250(F) (30-day)
Asbestos							7,000,000 fibers/L[7]
NOTE: Capital letters in parentheses refer to references listed 31.16(3); numbers in parentheses refer to table II footnotes.							

Table II – Footnotes

(1) For class 2 warm water aquatic life segments, where table value standards are to be applied, a specific chronic standard in the 0.06 to 0.10 mg/l range for un-ionized ammonia shall be selected based upon the aquatic life present or to be protected and whether the waters have been adversely impacted by factors other than ammonia. The Commission may consider a standard higher than 0.08 mg/l un-ionized ammonia where a higher risk of sublethal effects is justified by habitat limitations or other water quality factors. Where a site-specific study has been conducted, the Commission may apply appropriate alternative chronic standards in accordance with section 31.7(1)(b)(iii). Acute standards for cold and warm water class 2 segments generally shall be established at the respective levels listed in table II for class 1 segments, except where site-specific information submitted justifies an alternative acute standard.

(2) To be applied at the point of water supply intake.

(3) In order to provide a reasonable margin of safety to allow for unusual situations such as extremely high water ingestion or nitrite formation in slurries, the NO3-N plus NO2-N content in drinking waters for livestock and poultry should be limited to 100ppm or less, and the NO2-N content alone be limited to 10ppm or less.

(4) $FT = 10^{0.03(20-TCAP)}$;
Where TCAP is # T # 30
$FT = 10^{0.03(20-T)}$;
Where 0 is # T # TCAP
TCAP = 20° C cold water aquatic life species present
TCAP = 25° C cold water aquatic life species absent
FPH = 1; Where 8 <pH 9
$FPH = 1 + 10^{(7.4-pH)}$;
1.25 Where 6.5 # pH # 8
FPH means the acute pH adjustment factor, defined by the above formulas.
FT Means the acute temperature adjustment factor, defined by the above formulas.
T means temperature measured in degrees celsius.
TCAP means temperature CAP; the maximum temperature which affects the toxicity of ammonia to salmonid and non-salmonid fish groups. 51
NOTE: If the calculated acute value is less than the chronic value, then the chronic value shall be used as the acute standard.

(5) Salmonids and other sensitive fish species present:
Acute= 0.10 (0.59 * [Cl-]+3.90) mg/l NO2-N
Chronic= 0.10 (0.29 * [Cl-]+0.53) mg/l NO2-N
(upper limit for Cl- =40 mg/l)
Salmonids and other sensitive fish species absent:
Acute= 0.20 (2.00 * [Cl-]+0.73) mg/l NO2-N
Chronic=0.10 (2.00 *[Cl-]+0.73) mg/l NO2-N
[Cl-] = Chloride ion concentration
(upper limit for Cl- =22 mg/l)

(6) A combined total of nitrite and nitrate at the point of intake to the domestic water supply shall not exceed 10 mg/l. Asbestos standard applies to fibers 10 micrometers or longer.

TABLE III METAL PARAMETERS (Concentration in ug/l)						
METAL[1]	AQUATIC LIFE[1][3][4][J]		AGRICULTURE[2]	DRINKING WATER-SUPPLY[2]	WATER + FISH[7]	FISH INGESTION[10]
	ACUTE	CHRONIC				
Aluminum	750	87			---	---
Antimony				6.0 (30-day)	6.0	4,300
Arsenic	340	150	100[A] (30-day)	50[E] (1-day)	0.018	0.14
Barium				1,000[E](1-day) 490 (30-day)	---	---
Beryllium			100[A,B] (30-day)	4.0 (30-day)	---	---
Cadmium	$(1.13667-[(\ln(hardness)*(0.04184)])*e^{(1.128[\ln(hardness)]-3.6867)}$ (Trout)$=(1.13667-[(\ln(hardness)*(0.04184)])*e^{(1.128[\ln(hardness)]-3.828)}$	$(1.10167-[(\ln(hardness)*(0.04184)])*e^{(0.7852[\ln(hardness)]-2.715)}$	10[B] (30-day)	5.0[E] (1-day)	---	---
Chromium III[5]	$e^{(0.819[\ln(hardness)]+2.5736)}$	$e^{(0.819[\ln(hardness)]+0.5340)}$	100[B] (30-day)	50[E] (1-day)	---	---
Chromium VI[5]	16	11	100[B] (30-day)	50[E] (1-day)	100(30-day)	---
Copper	$e^{(0.9422[\ln(hardness)]-1.7408)}$	$e^{(0.8545[\ln(hardness)]-1.7428)}$	200[B]	1,000[F] (30-day)	---	---
Iron		1,000(tot.rec.)[A,C]		300(dis)[F] (30-day)	---	---
Lead	$(1.46203-[(\ln(hardness)*(0.145712)])*e^{(1.273[\ln(hardness)]-1.46)}$	$(1.46203-[(\ln(hardness)*(0.145712)])*e^{(1.273[\ln(hardness)]-4.705)}$	100[B] (30-day)	50[E] (1-day)	—	---

TABLE III METAL PARAMETERS (Concentration in ug/l)						
METAL[1]	AQUATIC LIFE[1][3][4][5]		AGRICULTURE[2]	DRINKING WATER-SUPPLY[2]	WATER + FISH[7]	FISH INGESTION[10]
	ACUTE	CHRONIC				
Manganese	$e^{(0.3331[\ln(hardness)]+6.4676)}$	$e^{(0.3331[\ln(hardness)]+5.8743)}$	200[B] (30-day)	50(dis)[F] (30-day)	—	---
Mercury	1.4	0.77 FRV(fish)[6] = 0.01 (Total)		2.0[E] (1-day)	—	---
Nickel	$e^{(0.846[\ln(hardness)]+2.253)}$	$e^{(0.846[\ln(hardness)]+0.0554)}$	200[B] (30-day)	100[E] (30-day)	—	4,600
Selenium[9]	18.4	4.6	20[B,D] (30-day)	50[E] (30-day)	—	---
Silver	$\frac{1}{2}e^{(1.72[\ln(hardness)]-6.52)}$	$e^{(1.72[\ln(hardness)]-9.06)}$ (Trout) = $e^{(1.72[\ln(hardness)]-10.51)}$		100[F] (1-day)	—	---
Thallium		15[C]		0.5 (30-day)	0.5	6.3
Uranium	$e^{(1.1021[\ln(hardness)]+2.7088)}$	$e^{(1.1021[\ln(hardness)]+2.2382)}$			---	---
Zinc	$e^{(0.8473[\ln(hardness)]+0.8618)}$	$e^{(0.8473[\ln(hardness)]+0.8699)}$	2000[B] (30-day)	5,000[F] (30-day)		
NOTE: Capital letters in parentheses refer to references listed in section 31.16(3); Numbers in parentheses refer to Table III footnote						

Table III – Footnotes

(1) Metals for aquatic life use are stated as dissolved unless otherwise specified. Where the hardness-based equations in Table III are applied as Atable value@ water quality standards for individual water segments, those equations define the applicable numerical standards. As an aid to persons using this regulation, Table IV provides illustrative examples of approximate metals values associated with a range of hardness levels. This table is provided for informational purposes only.

(2) Metals for agricultural and domestic uses are stated as total recoverable unless otherwise specified.

(3) Hardness values to be used in equations are in mg/l as calcium carbonate and shall be no greater than 400 mg/l. The hardness values used in calculating the appropriate metal standard should be based on the lower 95 per cent confidence limit of the mean hardness value at the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used. In calculating a hardness value, regression analyses should not be extrapolated past the point that data exist.

(4) Both acute and chronic numbers adopted as stream standards are levels not to be exceeded more than once every three years on the average.

(5) Unless the stability of the chromium valence state in receiving waters can be clearly demonstrated, the standard for chromium should be in terms of chromium VI. In no case can the sum of the instream levels of Hexavalent and Trivalent Chromium exceed the water supply standard of 50ug/l total chromium in those waters classified for domestic water use.

(6) FRV means Final Residue Value and should be expressed as "Total" because many forms of mercury are readily converted to toxic forms under natural conditions. The FRV value of 0.01 ug/liter is the maximum allowed concentration of total mercury in the water that will present bioconcentration or bioaccumulation of methylmercury in edible fish tissue at the U.S. Food and Drug Administration's (FDA) action level of 1 ppm. The FDA action level is intended to protect the average consumer of commercial fish; it is not stratified for sensitive populations who may regularly eat fish.

A 1990 health risk assessment conducted by the Colorado Department of Public Health and

Environment indicates that when sensitive subpopulations are considered, methylmercury levels, in sport-caught fish as much as one-fifth lower (0.2 ppm) than the FDA level may pose a health risk.

In waters supporting populations of fish or shellfish with a potential for human consumption, the Commission can adopt the FRV as the stream standard to be applied as a 30-day average. Alternatively, the Commission can adopt site-specific ambient based standards for mercury in accordance with section 31.7(1)(b)(ii) and (iii). When this option is selected by a proponent for a particular segment, information must be presented that (1) ambient water concentrations of total 55 mercury are detectable and exceed the FRV, (2) that there are detectable levels of mercury in the proponent's discharge and that are contributing to the ambient levels and (3) that concentrations of methylmercury in the fish exposed to these ambient levels do not exceed the maximum levels suggested in the CDH Health Advisory for sensitive populations of humans. Alternatively or in addition the proponent may submit information showing that human consumption of fish from the particular segment is not occurring at a level which poses a risk to the general population and/or sensitive populations.

(7) Applicable to all Class 1 aquatic life segments which also have a water supply classification or Class 2 aquatic life segments which also have a water supply classification designated by the Commission after rulemaking hearing. These Class 2 segments will generally be those where fish of a catchable size and which are normally consumed are present, and where there is evidence that fishing takes place on a recurring basis. The Commission may also consider additional evidence that may be relevant to a determination whether the conditions applicable to a particular segment are similar enough to the assumptions underlying the water plus fish ingestion criteria to warrant the adoption of water plus fish ingestion standards for the segment in question.

(8) The use of 0.1 micron pore size filtration for determining dissolved iron is allowed as an option in assessing compliance with the drinking water standard.

(9) Selenium is a bioaccumulative metal and subject to a range of toxicity values depending upon numerous site-specific variables.

(10) Applicable to the following segments which do not have a water supply classification: all Class 1 aquatic life segments or Class 2 aquatic life segments designated by the Commission after rulemaking hearing. These class 2 segments will generally be those where fish of a catchable size and which are normally consumed are present, and where there is evidence that fishing takes place on a recurring basis. The Commission may also consider additional evidence that may be relevant to a determination whether the conditions applicable to a particular segment are similar enough to the assumptions underlying the fish ingestion criteria to warrant the adoption of fish ingestion standards for the segment in question.

Table IV
Table Value Standards for Selected Hardnesses
(concentration in ug/L, dissolved)
Mean In Mg/L calcium carbonate
Hardness

		25	50	75	100	150	200	250	300	350	400
Cadmium	Acute	0.8	1.8	2.7	3.7	5.7	7.8	10	12	14	17
	trout										
	Acute	1.0	2.0	3.1	4.3	6.6	9.0	12	14	17	19
	Chronic	0.8	1.3	1.8	2.2	3.0	3.7	4.4	5.0	5.6	6.2
Chromium III	Acute	183	323	450	570	794	1005	1207	1401	1590	1773
	Chronic	24	42	59	74	103	131	157	182	207	231
Copper	Acute	3.6	7.0	10	13	20	26	32	38	44	50
	Chronic	2.7	5.0	7.0	9.0	13	16	20	23	26	29
Lead	Acute	14	30	47	65	100	136	172	209	245	281
	Chronic	0.5	1.2	1.8	2.5	3.9	5.3	6.7	8.1	9.5	11
Manganese	Acute	1881	2370	2713	2986	3417	3761	4051	4305	4532	4738
	Chronic	1040	1310	1499	1650	1888	2078	2238	2379	2504	2618
Nickel	Acute	145	260	367	468	660	842	1017	1186	1351	1513
	Chronic	16	29	41	52	72	94	113	132	150	168
Silver	Acute	0.19	0.62	1.2	2.0	4.1	6.7	9.8	13	18	22
	Chronic	0.01	0.02	0.05	0.08	0.15	0.25	0.36	0.50	0.65	0.81
	Trout										
	Chronic	0.03	0.10	0.20	0.32	0.64	1.0	1.6	2.1	2.8	3.5
Uranium	Acute	521	1119	1750	2402	3756	5157	6595	8062	9555	11070
	Chronic	326	699	1093	1501	2346	3221	4119	5036	5968	6915
Zinc *	Acute	36	65	92	117	165	211	255	297	339	379
	Chronic	36	66	92	118	167	212	256	299	340	381

The acute and chronic standards for dissolved Zinc are approximately the same, with the chronic standard being slightly higher than the acute standard at higher hardness'

Appendix C
Stream and Waterbody Segmentation / Classification

STREAM CLASSIFICATIONS and WATER QUALITY STANDARDS

REGION: 13 BASIN: UPPER ARKANSAS RIVER Stream Segment Description	Desig	Classifications	NUMERIC STANDARDS PHYSICAL and BIOLOGICAL	INORGANIC mg/l		METALS ug/l			TEMPORARY MODIFICATIONS AND QUALIFIERS
1a. All streams, wetlands, lakes and reservoirs within Mount Massive and Collegiate Peaks Wilderness areas.	OW	Aq Life Cold 1 Recreation 1a Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml E.Coli=126/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
1b. Mainstem of the East Fork of the Arkansas River from its source to a point immediately above the confluence with Birdseye Gulch.		Aq Life Cold 1 Recreation 1a Water Supply	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml E.Coli=126/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005	S=0.002 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modifications: Pb(ch)=6.5 Zn(ch)=137 Expiration date of 12/31/07.
2a. Mainstem of the East Fork of the Arkansas River and the Arkansas River from a point immediately above the confluence with Birdseye Gulch to a point immediately above the confluence with the California Gulch.		Aq Life Cold 1 Recreation 1a Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml E.Coli=126/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011	CN=0.005 S=0.002 B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ch)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=1000(Trec) Fe(ch)=WS(dis) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
2b. Mainstem of the Arkansas River from a point immediately above California Gulch to a point immediately above the confluence with Lake Fork.		Aq Life Cold 1 Recreation 1a Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml E.Coli=126/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011	CN=0.005 S=0.002 B=0.75 NO_2=0.05	As(ch)=100(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ch)=100(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS	Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modifications: Cd(ch)=1.3 no Zn(ac) Zn(ch)=270 Expiration date of 12/31/07.
2c. Mainstem of the Arkansas River from a point immediately above the confluence with the Lake Fork to a point immediately above the confluence with Lake Creek.		Aq Life Cold 1 Recreation 1a Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml E.Coli=126/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011	CN=0.005 S=0.002 B=0.75 NO_2=0.05	As(ch)=100(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ch)=100(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS	Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modifications: no Zn(ac) Zn(ch)=250 Expiration date of 12/31/07.
3. Mainstem of the Arkansas River from a point immediately above the confluence with the Lake Creek to the inlet to Pueblo Reservoir.		Aq Life Cold 1 Recreation 1a Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml E.Coli=126/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modifications: Pb(ch)=1.8 Zn(ch)=101 Expiration date of 12/31/07.
4. Deleted.									
5. All tributaries to the Arkansas River, including wetlands, lakes and reservoirs, from the source to immediately below the confluence with Browns Creeks, except for specific listings in segments 6 through 12.		Aq Life Cold 1 Recreation 1a Water Supply Agriculture	D.O. = 6.0 mg/l D.O. (sp)=7.0 mg/l pH = 6.5-9.0 F.Coli=200/100ml E.Coli=126/100ml	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modifications: Zn(ch)=78 Expiration date of 12/31/07.

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Monitoring & Assessment Design Workbook

Appendix D
Treatment of Sediment

D. Sediment Assessment

In 1996, the Colorado Sediment Task Force formed to develop a guidance document that could be used by agencies and interested parties in implementing the state's narrative sediment standard for "clean sediment". The product of the Task Force was the "Implementation Guidance for the Determination of Impacts to Aquatic Life in Streams and Rivers Caused by the Deposition of Sediment" (Sediment Guidance). This provisional guidance was readopted by the Water Quality Control Commission in 2000 but still retains its provisional status. The procedures in the sediment guidance will be the key component in determining whether aquatic life uses within a stream segment are impaired due to excessive sediment. The Division, other state and federal agencies, and local entities have been implementing the sediment guidance on streams identified on the 303(d) list and Monitoring and Evaluation list. Agencies currently evaluating streams include WQCD, CDOW, USFS, BLM and various other municipal entities.

The approach of the sediment guidance is to compare a sediment-impacted stream to a reference February, 2002 Part III: Surface Water Assessment condition for that stream. The reference condition is the stream condition (including sediment deposition and aquatic life) in the absence of sediment impacts. The following steps outline how the comparison of impacted stream to reference stream is made.

- Establish a stakeholder group of multidisciplinary members to design the study and assess endpoints.

- Identify candidate sediment-impacted segments by reviewing reports [305(b), etc.] and completing screening-level reconnaissance surveys

- Establish an expected or reference condition, considering physical, chemical, and biological attributes (such as watershed size, stream size, ecoregion, channel morphology, flow regime, and elevation)

- Identify reference conditions for comparison, by selecting a reference area that is representative of similar physical and ecological characteristics or is based on an upstream downstream comparison or hypothetical condition.

- Complete habitat evaluations at the study and reference areas. The analyses must be quantitative for comparison and expressed as a percent of the reference condition. Analysis may include pebble counts, residual pool volume (V*), embeddedness measurements, and channel type.

- Assess the benthic macroinvertebrate and /or fish communities using biomass, abundance, and sediment tolerance endpoints. Impacts to aquatic life are expressed as the percent of reference condition.

- Determined attainment (attained, threatened, or exceeded) of the narrative standard by comparing the percent of reference condition for biological quality

and physical habitat quality, according to the matrix in Table 3: Narrative Standard Attainment Matrix.

Table 3: Narrative Sediment Standard Attainment Matrix				
	Biological Quality as a% of Reference Condition			
Substrate Habitat Quality as a Percentage of Reference Condition	**0%–17% Severely Impaired**	**18%–50% Moderately Impaired**	**51%–79% Slightly Impaired**	**80%–100% Nonimpaired**
0%–58% (Nonsupporting)	Exceeded	Threatened	Attained	Attained
59%–73% (Partially Supporting)	Threatened	Threatened	Attained	Attained
74%–100% (Supporting Comparable)	Attained	Attained	Attained	Attained

Appendix E
Treatment of Biological

COLORADO

Contact Information

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Program Description

The Monitoring Unit of the Water Quality Control Division, Colorado Department of Public Health and Environment (CDPHE), is responsible for designing studies and collecting chemical, physical, and biological data from a statewide network of sampling stations. Personnel from the Assessment Unit of the Water Quality Control Division evaluate this information, along with data from other agencies. Using a watershed-specific approach, the seven major watersheds within the State of Colorado are assessed sequentially as part of the triennial review of water quality standards and classifications. In addition, specific waterbodies are assessed as part of targeted synoptic studies, site-specific studies, and as required for evaluating waterbodies listed on the State of Colorado's 303(d) list.

Most biological assessments are performed to evaluate aquatic life use classifications and to support standards development. Biological assessments have occasionally been used to determine attainment of aquatic life uses or attainment of provisional sediment standards. However, chemical information from surface water samples is primarily used to assess use support determinations as reported in the State of Colorado's biennial Status of Water Quality report. Biologists in the Monitoring Unit are actively developing biocriteria to more effectively utilize biological information as part of the State of Colorado's water quality standards program. Initially, biocriteria will be developed for benthic macroinvertebrates. Over the last four years, biologists in the Monitoring Unit have collected benthic macroinvertebrate samples from approximately 300 potential reference/least impaired sites from all dominant ecoregions within the State of Colorado. This data is currently being evaluated. Combined with information on physical habitat and water chemistry, this benthic macroinvertebrate data will be used to develop provisional region-specific biocriteria. Once developed, these provisional biocriteria will be evaluated using new benthic macroinvertebrate information, and further refined as needed. It is anticipated that benthic macroinvertebrate biocriteria will be used as an assessment tool to support the water quality standards and classification programs within the State of Colorado. Biocriteria based on fishery information may be developed in the future.

Documentation and Further Information

Colorado's 2002 305(b) report and 1998 303(d) list: http://www.cdphe.state.co.us/op/wqcc/wqresdoc.html

Draft 2001 Unified Assessment Methodology, Guidance on Data Requirements and Data Interpretation Methods Used in Stream Standards and Classification Proceedings, July 1993:
http://www.cdphe.state.co.us/wq/Assessment/assessment_practices_and_methods.htm

Water Quality in Colorado 2000: http://www.cdphe.state.co.us/wq/waterqualitybooklet.pdf

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COLORADO

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Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
	UD	promulgated into state water quality standards as biocriteria
		support of antidegradation
	✓	evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
	✓	other: determine attainment of narrative sediment (clean) standard
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(comprehensive use throughout jurisdiction, specific river basins or watersheds, and special projects)*
	✓	fixed station (i.e., water quality monitoring stations) *(specific river basins or watersheds)*
		probabilistic by stream order/catchment area
		probabilistic by ecoregion, or statewide
	✓	rotating basin *(comprehensive use throughout jurisdiction)*
		other:

Stream Miles

Total miles *(determined using RF3)*	**107,403**
Total perennial miles	31,415
Total miles assessed for biology*	**n/a**
fully supporting for 305(b)	n/a
partially/non-supporting for 305(b)	n/a
listed for 303(d)	85.1
number of sites sampled *(on an annual basis)*	~70 -100
number of miles assessed per site	–

*Colorado does not use bioassessment in 305(b) assessments with some exceptions. Since Colorado's water quality standards are chemically oriented, the majority of use support determinations are based on chemical data. Bioassessments are conducted as part of the Triennial Standards Review process for Colorado's seven major watersheds; a few are used in the determination of aquatic life use and sediment standards attainment. The majority of CDPHE's work in the field is spent conducting bioassessments in preparation for the review process. During the review process, the Water Quality Control Commission uses biological data to determine the appropriate aquatic life use classification for 636 stream segments. Once classifications are set, all further water quality monitoring and assessment is chemical.

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Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Class System, Warm Water vs. Cold Water	
ALU designations in state water quality standards	Three classifications: Class 1 Cold Water Aquatic Life, Class 1 Warm Water Aquatic Life, Class 2 Cold and Warm Water Aquatic Life	
Narrative Biocriteria in WQS	under development*	
Numeric Biocriteria in WQS	none*	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
	✓	cause and effect determinations
	✓	permitted discharges
		monitoring (e.g., improvements after mitigation)
		watershed based management
Uses of bioassessment/ biocriteria uses in making management decisions regarding restoration of aquatic resources to a designated ALU	Bioassessment endpoints are used as targets in the attainment of the sediment standard (e.g. TMDL development).	

*ALU classifications are defined in Colorado's water quality standards but are not considered to be formal narrative biocriteria in the CO regulatory process. Colorado is presently developing biocriteria through a stakeholder workgroup process.

Reference Site/Condition Development**

Number of reference sites	**300 total potential reference/least impaired sites**	
Reference site determinations	✓	site-specific
		paired watersheds
		regional (aggregate of sites)
	✓	professional judgment
		other:
Reference site criteria	The condition of candidate sites is verified through field evaluation using a "checklist" of stream attributes that include, but are not limited to, measures of riparian condition, Rosgen channel type, land use, basin characteristics, physical habitat, substrate, chemistry, geology, vegetation, and climate.	
Characterization of reference sites within a regional context	✓	historical conditions
	✓	least disturbed sites
		gradient response
	✓	professional judgment
	✓	other: minimally disturbed***
Stream stratification within regional reference conditions	UD	ecoregions (or some aggregate)
		elevation
	✓	stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
		other:
Additional information	n/a	reference sites linked to ALU
	n/a	reference sites/condition referenced in water quality standards
	n/a	some reference sites represent acceptable human-induced conditions

**Reference condition is used on a limited basis in Colorado. Currently, it is used as a key component in determining sediment deposition impacts to aquatic life and has been used in the first stages of biocriteria development, to locate sampling sites, as part of various EMAP studies underway in CO, and in the development of regional nutrient criteria. The reference condition approach is not developed enough to be an established part of biological assessments or the standards setting process in Colorado. Most, if not all, assessments are conducted on a case-by-case or site-specific basis, and although CO does attempt to characterize the "expected condition" for a particular waterbody, it is not treated as a formal reference condition.

***Sediment guidance suggests 3 tiers for reference conditions like those described in the 1996 EPA technical guidance for biological criteria: 1) minimally disturbed, 2) best available (least disturbed), and 3) none acceptable ("hypothetical explanation"). These can be considered individually and in combination.

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Field and Lab Methods*

Assemblages assessed	✓	benthos *(100 - 500 samples/year; single season, multiple sites - watershed level)*
	✓	fish *(<100 samples/year; single season, multiple sites - not at watershed level)*
	UD	periphyton *(<100 samples/year; single season, multiple sites - watershed level)*
		other:
Benthos		
sampling gear		Surber, dipnet; 500 - 600 micron mesh
habitat selection		riffle/run (cobble) or most productive habitat if riffle/run is not available
subsample size		300 count
taxonomy		lowest possible level with positive identification
Fish		
sampling gear		backpack electrofisher
habitat selection		multihabitat
sample processing		length measurement
subsample		none
taxonomy		species
Periphyton		
sampling gear		**natural substrate**: brushing/scraping device (razor, toothbrush, etc), collect by hand
habitat selection		riffle/run (cobble)
sample processing		chlorophyll *a*/ phaeophytin, taxonomic identification
taxonomy		all algae, species level
Habitat assessments		visual based, hydrogeomorphology, pebble counts; performed with bioassessments
Quality assurance program elements		standard operating procedures, periodic meetings and training for biologists, specimen archival

*Field and lab methods reported are those used by the Monitoring Unit of the CDPHE Water Quality Control Division and are patterned after the EPA RBP approach. They do not apply to any of the other agencies collecting biological data in Colorado.

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
		parametric ANOVAs
		multivariate analysis
	✓	biological metrics *(return single metrics)*
		disturbance gradients
		other:
Multimetric thresholds		
transforming metrics into unitless scores		impairment thresholds determined on case-by-case basis as part of site-specific analyses
defining impairment in a multimetric index		Colorado is currently exploring possible metrics and indices through a workgroup process.
Evaluation of performance characteristics		repeat sampling
	✓	precision *(replicate samples collected at 10% of sites)*
		sensitivity
		bias
		accuracy
Biological data		
Storage		Currently moving all biological and habitat data into EDAS
Retrieval and analysis		EDAS, Excel, Minitab

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Appendix F
Naming Conventions

The goal of Colorado's monitoring program is to provide information needed to assess the surface waters and provide information for the state's water quality management activities. Specific objectives for monitoring are addressed below.

In order to conveniently track information about individual stream segments and lakes, Colorado has adopted the Water Body Identification (WBID) system. The WBID consists of an eight- to ten-character alphanumeric series that represents the state, major river basin, minor river basin, and river segment number for each location. All WBIDs for Colorado surface water bodies start with the letters CO signifying Colorado. The third and forth letters denote the major river basin (i.e. Arkansas, Rio Grande, Colorado, South Platte, etc.) and the fifth and sixth letters denote the minor river basin (i.e. Upper, Middle or Lower part, Clear Creek, Cherry Creek, Boulder Creek, etc.). The seventh through tenth numbers, and sometimes letters (L = lakes, S = streams, or A, B, and C), designate the specific segment number. These segment numbers identify the names of the tributaries of the minor stream basins and correspond to those in the Classifications and Numeric Standards for each major basin. The key to Colorado's WBIDs is presented in Table 1: Key to Colorado's WBIDs.

Example: COARUA01A = Colorado, Arkansas River Basin, Upper Arkansas River Basin, segment 1A.

Table 1: The Key to Colorado's WBIDs

Letters 1-2 = Colorado	*Letters 3-4 = Major River Basin*	*Letters 5-6 = Minor River Basin*
CO	**SP** South Platte Basin	**US** Upper South Platte River Basin **CC** Cherry Creek **BE** Bear Creek Basin **CL** Clear Creek Basin **BD** Big Dry Creek Basin **BO** Boulder Creek Basin **SV** St Vrain Creek Basin **MS** Middle South Platte River Basin **BT** Big Thompson River Basin **CP** Cache La Poudre River Basin **LA** Laramie River Basin **LS** Lower South Platte River Basin **RE** Republican River Basin
CO	**UC** Upper Colorado and North Platte Basin	**UC** Upper Colorado River Basin **BL** Blue River Basin **EA** Eagle River Basin **RF** Roaring Fork River Basin **NP** North Platte River Basin **YA** Yampa River Basin

Table 1: The Key to Colorado's WBIDs (Continued)

Letters 1-2 = Colorado	*Letters 3-4 = Major River Basin*	*Letters 5-6 = Minor River Basin*
CO	**LC** Lower Colorado Basin	**LY** Lower Yampa/Green River Basin **WH** White River Basin **LC** Lower Colorado river Basin
CO	**AR** Arkansas Basin	**UA** Upper Arkansas River Basin **MA** Middle Arkansas River Basin **FO** Fountain Creek Basin **LA** Lower Arkansas River Basin **CI** Cimarron River Basin
CO	**RG** Rio Grande Basin	**RG** Rio Grande River Basin **AL** Alamosa River/La Jara Creek/ Conejos Creek Basin **CB** Closed Basin/San Luis Valley Basin
CO	**GU** Gunnison and Lower Dolores River Basins	**UG** Upper Gunnison River Basin **NF** North Fork of the Gunnison River Basin **UN** Uncompahgre River Basin **LG** Lower Gunnison River Basin **SM** San Miguel River Basin **LD** Lower Dolores River Basin
CO	**SJ** San Juan River and Dolores River Basins	**SJ** San Juan River Basin **PI** Piedra River Basin **PN** Los Pinos River Basin **AF** Animas and Florida Rivers Basin **LP** La Plata River, Mancos River, McElmo Creek and San Juan **DO** (Upper) Dolores River Basin

Appendix G
303(d) example

WBID	Segment Description	Portion	Impairment	Priority
COAR	**Arkansas River Basin**			
COARLA01c	Arkansas River, John Martin Reservoir to stateline	all	Se	L
COARLA04	Apishapa River, Timpas Creek, Lorencito Canyon	all	Fe(Trec), Se	L
COARLA07	Purgatoire River, I-25 to Arkansas River	all	Se	L
COARLA09a	Mainstem of Adobe Creek and Gageby Creek…	all	Se	L
COARLA09c	Rule Creek, Muddy Creek, Caddoa Creek, Clay Creek, Cat Creek…	all	Fe(Trec), Se	L
COARMA02	Arkansas River, Pueblo Reservoir to Wildhorse Creek	all	Se	L
COARMA03	Arkansas River, Wildhorse Creek to Fountain Creek	all	Se	L
COARMA04a	Wildhorse Creek	all	Se	L
COARMA05	St. Charles River and tributaries, source to CF&I diversion	all	Se	L
COARMA06	St. Charles River and tributaries, CF&I diversion to Arkansas River	all	Fe(Trec), Se	L
COARMA10	Sixmile Creek	all	Fe(Trec), Se	L
COARMA12	Huerfano River, from Muddy Creek to the Arkansas River	all	Se	L
COARMA13	Cucharas River, source to Walsenburg PWS diversion	all	f. coliform	H

WBID	Segment Description	Portion	Impairment
COAR	**Arkansas River Basin**		
COARFO03	Tributaries to Fountain Creek on USFS or AFA lands, Monument Creek to Arkansas River	Bear Creek on USFS Land	sediment
COARFO03	Tributaries to Fountain Creek on USFS or AFA lands, Monument Creek to Arkansas River	Cheyenne Creek, on USFS Land	sediment
COARLA07	Purgatoire River, I-25 to Arkansas River	all	sediment
COARLA09a	Mainstem of Adobe Creek and Gageby Creek…	Adobe Creek	Fe(Trec)
COARLA11	John Martin Reservoir	all	Se
COARMA05	St. Charles River and tributaries, source to CF&I canal	Snow Slide Creek	sediment
COARUA10	Lake Creek and tributaries, except S. Fork Lake Creek	N. Fork Lake Creek, diversion tunnel to confluence with S. Fork Lake Creek	sediment
COARUA10	Lake Creek and tributaries, except S. Fork Lake Creek	Lake Creek below S. Lake Creek, on USFS Land	sediment
COARUA11	Sayres Gulch, & S. Fork Lake Creek, Sayres Gulch to Lake Creek	all	Al, Fe, Pb
COARUA12a	Chalk Ck.	below Mary Murphy Mine	Cd, Zn

Appendix H
Assessment Protocols for Listing and Delisting

SECTION 303(d) LISTING METHODOLOGY 2004 Listing Cycle

I. INTRODUCTION

Section 303(d) of the federal Clean Water Act requires states to identify waters where effluent limitations mandated by Section 301(b)(1)(A) and Section 301(b)(1)(B) are not stringent enough to attain water quality standards. These waters are compiled into the Section 303(d) list of impaired waters. The Colorado Section 303(d) List identifies those water bodies, which are impaired by one or more pollutants. Total Maximum Daily Loads ("TMDLs") are required for each listed water body. The 2004 Section 303(d) List is roughly equivalent to Category 5 waters in EPA's July 21, 2003 *Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act*; TMDL0103 ("Integrated Reporting Guidance").

The 2004 Monitoring and Evaluation List ("M&E List") will identify water bodies where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more factors, such as the representative nature of the data. Water bodies that are impaired but it is unclear whether the cause of impairment is attributable to pollutants as opposed to pollution will also be placed on the M&E List. The M&E List will contain water bodies that would be reflected in Category 2 or 3 of EPA's Integrated Reporting Guidance.

Waters that are on neither the Section 303(d) List nor the M&E List are either:

- Attaining their uses and standards (EPA's Category 1)
- Have not been fully assessed (EPA's Category 2 or 3)
- Impaired, but do not require a TMDL (EPA's Category 4)

EPA's Category 4 includes impaired waterbodies for which TMDLs have been completed, but uses are not yet attained; impaired waterbodies for which other control mechanisms are in place which will assure that uses will be attained; and impaired waterbodies for which the impairment is not caused by a pollutant.

Section II of this document identifies the process that the Water Quality Control Division ("Division") and Water Quality Control Commission ("Commission") intend to follow in establishing the Section 303(d) and M&E Lists. Section III contains the Listing Criteria and Section IV contains the Prioritization Criteria.

II. LISTING PROCESS

A. Development of the Methodology

The Division has solicited public participation to develop the 2004 Section 303(d) Listing Methodology through several means. The methodology for development of the 2002 Lists was used as a starting point. This earlier version was developed in a public process. Several work group meetings were held in 2003 to address the needs of the 2004 listing cycle.

B. Process for Adopting the Methodology

The process for formal consideration and acceptance of the Listing Methodology was discussed at the April 2003 Commission meeting. The Commission decided that the following process would be used for finalizing the Section 303(d) Listing Methodology:

- The Division proposal will be available for public review by about July 1, 2003 as an attachment to the notice of the September public hearing on the Listing Methodology. It will also be available on the Commission's website, emailed to participants in the Workgroup, and the notice will be published in the Monthly Water Quality Information Bulletin.
- The notice will establish a deadline of July 31, 2003 for written comments on the proposed Listing Methodology, including any recommendations for alternative language in the document. The comments received will be posted on the Commission's web site and copies will be available in the Commission Office.

- The notice will also establish a deadline of August 20, 2003 for any written rebuttal comments in response to the July 31 comments. These rebuttal comments will be posted on the Commission's web site and copies will be available in the Commission Office.
- If the Division believes that the initial written comments and/or the rebuttal comments warrant revisions to the proposed Listing Methodology, it will submit a revised proposal by August 27, 2003. This revised proposal will be emailed to this work group and other distribution lists, posted on the Commission's web site and copies will be available in the Commission Office.
- No other written materials will be accepted for this hearing except by leave of the Commission, upon written explanation as to why such materials could not have been submitted in accordance with the above deadlines.
- An opportunity will be provided at the September hearing for any interested persons to provide oral comments regarding the proposed Listing Methodology.
- At the conclusion of the September hearing, the Commission will approve 2004 Section 303(d) Listing Methodology.

C. Process for Adopting the Section 303(d) and Monitoring & Evaluation Lists

The process for formal consideration and adoption of the Section 303(d) and M&E Lists was also discussed at the April 2003 Commission meeting. The Commission decided that the Lists would be adopted through a public rulemaking process, with the following steps:

- Any person that has data or other information that it wishes the Division to consider in determining which water segments and parameters to propose for listing or delisting (for either the Section 303(d) List or the M&E List) must provide that information to the Division by October 1, 2003.
- By November 3, 2003, the Division will release a list of water segments and parameters that it definitely intends to propose for inclusion on the 2004 Section 303(d) List.
- Any person who wishes to propose the listing of water segments/parameters that may not be proposed by the Division must submit any such proposal, with accompanying proposed statement of basis and purpose language, by November 18, 2003.

- A draft rulemaking hearing notice, with the Division's and any external proposals attached, will be prepared by the Commission Office, for inclusion in the Commission's December meeting packets. The draft notice and proposals will also be posted on the Commission's web site by about December 1, 2003, and will be emailed to the work group and other distribution lists.
- The Commission will review the draft notice and proposals at its December 8, 2003 regular meeting, and approve them for filing.
- The rulemaking hearing notice and proposals will be filed with the Secretary of State by December 19, 2003. The final notice and proposals will also be posted on the Commission's web site by about this date, and will be emailed to the work group and other distribution lists.
- The rulemaking notice will include contact information, for persons wishing to get more detailed information regarding the data or other information supporting the listing proposals advanced by the Division or other persons.
- The rulemaking hearing notice and proposal will be published in the January 10, 2004 Colorado Register.
- The notice will establish a party status deadline of about January 26, 2004.
- Written prehearing statements and any evidence (data and any other relevant information) regarding the appropriateness of listing the segments noticed for potential listing will be due by February 3, 2004.
- This February 3, 2004 deadline for the submission of evidence (data and any other relevant information) will apply to any information from any interested persons, not just those with party status.
- A prehearing conference will be held on approximately February 11, 2004.

- The notice will provide an opportunity for the submission of written rebuttal statements, in response to the February 3 submissions, by February 25, 2004. No new data or other new factual information will be accepted after February 3, but the rebuttal statements may contain different analyses and perspectives regarding what the submitted information show regarding attainment and the appropriateness of listing.
- Any data or other information that is not submitted in accordance with the above deadlines will be considered in the next listing cycle.
- The Commission's rulemaking hearing will be held on March 9, 2004. At the conclusion of the hearing, the Commission will approve the 2004 Section 303(d) List and the Monitoring and Evaluation List as rules (Regulation Nos. 93 and 94, respectively).

D. Process for Revising the Lists

In general, removal of waterbodies/pollutants from the Section 303(d) List is subject to the same requirements as those utilized for addition to the List. Removal from the List is considered appropriate where new information is developed which indicates that water quality standards are being met and / or designated uses are being attained. Considerations include more recent or more accurate data (for instance, chemical data generated using clean sampling/analytical methodologies), more sophisticated analysis using a calibrated model, identification of deficiencies in the original assessment or changes in standards, guidance or policy.

Sampling frequency and number of sampling events should be similar to, or greater than, that which was used as a basis to list the segment (an exception would be in the instance where data collected utilizing conventional methods is supplanted by clean-methods data). Assessments demonstrating attainment of designated uses should provide documentation of a nature similar to that used to support the listing decision. Attainment of water quality standards and uses will result in removal of the waterbody, or one or more listed parameters, from the list.

As described in EPA's Integrated Reporting Guidance, "good cause" for removing a water body (or water body pollutant combination) from the List includes:

- The assessment and interpretation of more recent or more accurate data demonstrate that the applicable classified uses and criteria are being met
- The results of more sophisticated water quality modeling demonstrate that the applicable classified uses and criteria are being met.
- Demonstration that flaws in the original analysis of data and information led to the water body pollutant combination being incorrectly listed.
- Development of a new listing methodology consistent with the State water quality standards and classifications and federal listing requirements, and a reassessment of the data that led to the prior listing, concluding that the water body is no longer impaired.
- Demonstration that there are effluent limitations required by state or local authorities that are more stringent than technology-based effluent limitations that will result in attainment of classified uses and criteria.
- Demonstration that there are other pollution control requirements required by State, local, or federal authorities that will result in attainment of classified uses and criteria within a reasonable time.
- Documentation that the State included on a previous Section 303(d) List an impaired water that was not required to be listed by EPA regulation, e.g. waters where there is no pollutant associated with the impairment.
- Approval or establishment by EPA of a TMDL since the last Section 303(d) List. Barring unforeseen circumstances, the Division will only propose to revise the Lists during the regularly scheduled reviews (currently biennially). Other interested persons may petition the Commission at any time to request a rulemaking hearing to revise the Lists (either additions or deletions). However, such hearing a will be held only upon a showing that failing to either

add a segment to the list or delete a segment from the list prior to the next scheduled review will result in a substantial hardship.

III. LISTING CRITERIA

This Listing Methodology sets forth the criteria that generally will be used to make decisions regarding which waters to include on the 2004 Section 303(d) List and the 2004 M&E List. However, this methodology is not being adopted by the Commission as a rule. The Commission will not be bound by the criteria set forth in the Listing Methodology in making individual listing decisions if it determines on a site-specific basis that an alternative approach provides a more appropriate method for assessing attainment of water quality classifications and standards in a particular circumstance.

A. Existing and Readily Available Data

In determining whether data and information is existing and readily available, the Division will take into account such data and information as it has utilized in the preparation of those identification processes, calculations and models referenced in 40 CFR §130.7(a)(5)(i), (ii) and (iv) and that credible data and information presented in a readily usable format and submitted in reports provided to the Division as referenced in 40 CFR §130.7(a)(5)(iii). In addition, the Division will accept and take into consideration credible data and information that is timely submitted to the Division as part of the listing process, whether submitted by EPA or any other interested party. The Division will also continue to independently collect and analyze new data on a rotating basin basis as part of its triennial review efforts and will utilize such data and information in making Listing determinations. Existing data, which is not brought forward through one of the above mechanisms or otherwise presented to the Division in accordance with the schedule, set out in Section II. C, above, will not be treated as "readily available" for purposes of making listing decisions. Such information will be considered in the next listing cycle.

The assessment process described is intended to provide continuity with similar assessments done to support the standards review process as well as to efficiently utilize Division resources. The Division uses a "rotating basin" approach, approved by EPA, for periodic standards review and coordinates water quality monitoring and assessment to support the review. The following schedule sets out the relationship between the basin reviews and when assessments generated by those reviews will be incorporated in the 303(d) Listing process.

COORDINATION BETWEEN THE STANDARDS REVIEW SCHEDULE AND SECTION 303(d) LIST CYCLE			
River Basins (and Regulation Number)	**Data Collection Effort**	**Standards Rulemaking Hearing**	**Assessments Incorporated into 303(d) List Cycle**
Arkansas & Rio Grande Basins(#32 & #36)	fall 2000 - fall 2001	July 2002	2004
Colorado Basin (#33 & #37)	fall 2001 - fall 2002	July 2003	2004
South Platte (#38)	fall 2002 - fall 2003	July 2004	2006
San Juan, Dolores & Gunnison (#34 & #35)	fall 2004 - fall 2005	July 2006	2006
Arkansas & Rio Grande (#32 & #36)	fall 2005 - fall 2006	July 2007	2008

B. Credible Evidence

The water quality assessment process depends on sufficient and reliable data. Listing decisions not supported by adequate data are potentially flawed. The listing criteria are intended to assure that only those waterbodies for which adequate documentation of non-attainment is available are included on the Section 303(d) list. Waterbodies for which there is evidence to suggest impairment, but for which such documentation does not meet the standards for credible evidence, will be assigned to the M&E list unless good cause is shown.

> Water bodies may be included on the Section 303(d) List based on an evaluation of biological, chemical or physical data. The Division will consider proposing to list a water body based upon consideration of all chemical, physical, and biological information that meets established sampling, analytical, and interpretive protocols. Considerations include a review of the sampling and analytical methods employed. Factors to be considered include analytical detection limits, sample size, spatial and temporal distribution, variability within the data set, and the use of clean methodologies. Listing is often based upon chemical data alone, subject to the data interpretation criteria identified within this document. Listing based upon biological or physical data in the absence of accompanying chemical data requires that such information clearly demonstrate use impairment. Representative data of each type will be sought and utilized whenever possible, especially where use impairment is the potential basis for the listing decision.

The following guidelines are used to evaluate the adequacy of water quality information as a basis to support listing a waterbody.

1. Information must be available to describe the methods used for sample collection, field and laboratory analysis. Persons submitting data during the public comment period must either provide the relevant quality assurance documentation with the submittal or assure that the documentation is available for the Division to review.

2. Chemical data should be supported by a Sampling and Analysis Plan (SAP), which identifies sampling locations, contains analytical method references, and incorporates Quality Assurance/Quality Control (QA/QC) provisions. QA/QC documentation may include references to a standard QA/QC protocol. Division QA/QC protocols may be obtained via the Division's website or as hard copy. During review of chemical data submitted for evaluation, the Division may require submittal of the SAP, QA/QC protocols and the results of QA/QC efforts. The Division will provide any such information to other parties upon request.

3. In-situ bioassay test results, or other ambient toxicity test results, must demonstrate adverse effects as measured by a statistically significant response relative to a representative reference or control. Inherent variability in toxicity testing results must be adequately taken into account. Listing decisions based upon toxicity test results require that any such results be corroborated by biological information clearly demonstrating impacts to aquatic community health, composition, or productivity. In general, interpretation of toxicity test results will conform to applicable portions of the Division documents Laboratory Guidelines for Conducting Whole Effluent Toxicity Tests (1998) and the Biomonitoring Guidance Document (updated 2002). Both documents may be obtained from the Division in hard copy or electronically on the Division web site.

4. Physical and biological assessments must be performed in accordance with scientifically sound methodologies. All such assessments should be performed by an observer who has training and experience in performing such evaluations. Assessment reports should include a statement of the observer's qualifications and should reference the protocols utilized. Any departures from referenced protocols and methodologies should be documented and the basis for any such departure addressed.

Though currently under review and subject to future revision, a specific method has been developed for use in demonstrating attainment or non-attainment of assigned aquatic life uses due

to sediment deposition. The document titled "Provisional Implementation Guidance for Determining Sediment Deposition Impacts to Aquatic Life in Streams and Rivers"; WQCC Policy 98-1 is available either in hard copy or electronically on the Colorado Water Quality Control Commission (WQCC) web site.

The Division will generally accept methodologies and protocols in use by the US Geological Survey, US Forest Service, US Bureau of Land Management, US Environmental Protection Agency, Colorado Division of Wildlife, or others, when well-documented, widely available and suitable for their intended purpose. The Division's determination of the acceptability or unacceptability of any such protocol will be included in the Division's discussion of data sources that the Division includes in the Section 303(d) List.

5. In general, information and data should be no older than 5 years. Readily available older data will be used on a case-by-case basis if such data is representative of current conditions and reflects adherence to acceptable protocols, or if the older data is used with newer data to demonstrate water quality trends. Parties submitting older data they wish considered should include an explanation of why such data continues to reflect current water quality conditions.

6. Anecdotal information, in the absence of chemical, physical, or biological data, will not in and of itself be adequate to support a listing decision unless such information provides clear and convincing evidence demonstrating non-attainment. Anecdotal information includes, but is not limited to fishing logs, field logs, and historical or archival documents.

7. Data collected during or immediately after temporary events influencing the waterbody that are not representative of normal conditions shall typically be discounted in making the listing decision. For example, low frequency storm events (e.g. 100 year events) which scour the stream, leading to diminished aquatic life use, or accidental spills of toxic chemicals would not be a basis upon which to list the affected segment. However, such events may be considered as a basis for listing in instances where non-attainment of standards arises from a reversible source of pollutants.

C. Data Interpretation

The water quality assessment process considers the numeric and narrative standards assigned to a segment, as well as the assigned use classifications. Numeric standards are identified for a given pollutant and are expressed as a threshold value or as an acceptable range of values. Determination of attainment/non-attainment of pollutant specific numeric standards is a relatively straightforward statistical process.

Narrative standards describe threshold conditions that, if exceeded, result in unacceptable water quality conditions. Narrative standards that are applied to all surface waters in Colorado address sediment, floatables, film, odor, taste, color, toxins, and excessive nutrients. Exceedance of narrative standards is more difficult to ascertain, as there are typically no quantifiable expressions of parameter concentration or loading that result in non-attainment. It is often the impact of pollution or of a pollutant, and not the pollutant itself, which is observed.

Use classifications identify existing or potential uses of the surface water segment. These include aquatic life, water supply, recreation and agricultural uses. Specific numeric standards are attached to a given use classification. Assignment of an aquatic life use classification to a segment typically results in assignment of a related suite of numeric standards. Attainment of numeric standards has served as a surrogate measure indicating attainment of the assigned use classification. However, non-attainment of an assigned use classification, as with narrative standards, may result from causes or parameters other than those assigned numeric standards.

1. Chemical Data - General

The Division document Guidance on Data Requirements and Data Interpretation Methods Used in Stream Standards and Classification Proceedings (1993) will be used for data assessment for list development. This document is available in hard copy or electronically on the Division's website. Additional criteria utilized in assessment of data developed for lakes and reservoirs are also noted.

a. Attainment of chronic chemical standards, in both streams and rivers, and lakes and reservoir systems, is based upon the 85th percentile of the ranked data, except as otherwise noted below. Percentile values are calculated by ranking individual data points in order of magnitude. Hardness-based metal standards are evaluated by comparing the 85th percentile against the assigned hardness-based equation using either the mean hardness or when available, paired hardness and concentration data. Total recoverable metals are evaluated against the median value, or the 50th percentile. Dissolved metals are evaluated against the 85th percentile. Dissolved oxygen ("DO") is evaluated at the 15th percentile. Minima pH is evaluated against the 15th percentile, maxima at the 85th.

b. Acute standards are evaluated by comparison of single sample values to the assigned standard.

c. Sample data that are below detection limits will, in general, be treated as zeroes for assessment of attainment.

d. Attainment of coliform standards is assessed using the geometric mean. Notwithstanding the criterion at item c. above, coliform data that is reported as less than detect will be treated as a value of one to allow calculation of a geometric mean.

e. Assessment techniques will be used that seek to reduce the effects of biased sampling. For example, the median of multiple samples taken within a seven-day period will be used to represent that time period, and information gathered during synoptic (sampling at many locations at the same time) sampling events may be considered in a separate assessment so as not to bias the conclusions.

2. Chemical Data - Lakes and Reservoirs

Data submitted to support listing decisions for lakes and reservoirs must be representative of the waterbody and account for seasonal and diel variation. The Division may require submittal of a Sampling and Analysis Plan, or other documentation, to assure sample results are representative for these conditions.

a. Assessment of DO will generally require that vertical profile data be developed for DO and temperature. Vertical profile data for temperature will be used to determine thermal stratification. DO criteria are applied to the epilimnion and metalimnion strata in lakes and reservoirs, unless otherwise stated in applicable control regulations. (DO in the hypolimnion may, due to natural conditions, be less than specified criteria). Only one exceedance is counted where more than one DO measurement in the profile (epilimnion and metalimnion) does not meet the criterion.

b. DO measurements from the entire water column (except for the bottom measurement, generally, the lowermost meter of the profile) will be used in a mixed lake or reservoir. Individual DO measurements are compared to the criterion.

c. Individual pH measurements are compared to minimum and maximum criteria.

d. Individual measurements for all other chemical parameters are compared to the appropriate numeric standards. When available, volumetrically weighted measurements will be utilized.

3. Biological and Physical Data

Biological and/or physical assessment protocols may support a determination of non-attainment of numeric standards or, alternately, non-attainment of narrative standards and classified uses. The Division, in interpreting physical and biological information, will give site-specific consideration to the applicability of the protocols in use and available metadata gathered to validate the information generated, the extent and nature of expertise of the observer, and the relative weight of the evidence presented.

Physical and biological assessments will typically consider measurable conditions or features within an affected segment in comparison to an "expected condition". The expected condition generally will be based upon a selected reference condition. Identification of reference conditions requires consideration of the level of disturbance (minimal), location (upstream, downstream, or within a separate drainage), historical condition, expected condition based on modeling or general expectations for highly managed systems, or other fair and reasonable comparison. Determination of reference conditions based upon sampling/assessment of multiple reference sites, when possible, is preferable but not required. Impairment of aquatic life use classifications or narrative toxicity standards will be demonstrated, for the limited purpose of listing, when either the physical/habitat data or biological community metrics reflect a condition that is significantly less than reference condition.

In instances where aquatic life use impairment is the result of excessive sediment deposition, the interpretation of such data will be as outlined in the Provisional Implementation Guidance for Determining Sediment Deposition Impacts to Aquatic Life in Streams and Rivers, Commission Policy 98-1.

4. Assessment of "All Tributary" segments

Generally, water quality data from multiple data sources and sampling sites is aggregated by segment for assessment of the segment as a whole. If there is some reason to believe that the impairment may not be representative of the entire segment, the Division will investigate further to determine whether the impairment is widespread or limited to individual portions of the segment such as specific tributaries or reaches. Based upon this assessment, either an entire segment or only a portion thereof may be proposed for listing.

D. Determination of Impairment

Application of chemical, physical and biological information in listing determinations requires consideration of the scientific rigor of the methodologies utilized to develop any such information, and the strength of that information. Rigor refers to the demonstrated validity of sampling, analytical, and assessment protocols and the availability of meta data in support of those protocols. Strength refers to the quantity of data and the extent to which such data demonstrates clear and convincing evidence of attainment or non-attainment of standards.

Availability of physical or biological data indicating use impairment may also be used to support listing when chemical data is otherwise insufficient in and of itself. Greater weight is given to data that provides direct, quantifiable documentation of impairment as opposed to data developed using surrogate indicators or parameters.

1. Impairment Where the Pollutant is Unknown

The federal Clean Water Act defines *pollution* as "the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water", CWA §502(19). Pollution may result from the introduction of pollutants or from causative factors other than pollutants. *Pollutants* are defined in the federal Clean Water Act at §502(6) to include "dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under Atomic Energy Act of 1954, as amended), heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water". Notwithstanding the federal definition cited above, certain radiological constituents are also regulated under the State's Water Quality Control Act and are considered to be pollutants.

TMDL development is required in those instances where one or more pollutants are the cause of non-attainment. TMDLs are not required where the impairment is the result of pollution that is not a pollutant. Water bodies that are impaired but it is unclear whether the cause of impairment is attributable to pollutants as opposed to pollution will be placed on the M & E List.

To the extent it is known that a "pollutant" is the cause of the impairment, but the identity of the specific pollutant is not yet known, the water body segment will be listed. However, the fact that the water body is so listed will not result in a prohibition of new or expanded discharges into the segment until the pollutant is identified. Permits may be affected once the pollutant is identified.

2. Impairment of Numeric Standards

Attainment of numeric chemical standards is assessed by comparison of ambient water quality against assigned standards. Assessment of chemical data considers attainment of both chronic and acute chemical standards, where both chronic and acute standards have been assigned to a given waterbody.

a. Chronic Standards: Values that fall outside of the percentile ranges described in Section III.C.1.a. Chemical Data - General, indicate non-attainment of chronic standards.

b. Acute Standards: Acute standards are assessed by comparison of individual sample values against the standard. In general, data indicates non-attainment of an acute standard if the standard is exceeded more frequently than once in three years.

c. Vertical Profiles: When attainment of lakes and reservoirs is assessed using vertical profile data, as for DO, each sampling event, i.e. all profiles sampled during a single day, will be treated as a single sample. If vertical profile data are not provided, the data from individual samples will be pooled. Regardless of the number of individual DO or pH measurements exceeding numeric criteria, a sampling event will be counted as a single exceedance.

d. Site-specific Standards: Some lakes and reservoirs have been assigned site-specific standards for nutrients (total phosphorus), dissolved oxygen, and chlorophyll a. These presently include Dillon Reservoir, Cherry Creek Reservoir, Chatfield Reservoir, and Bear Creek Reservoir. Lakes and reservoirs are evaluated on an annual basis for compliance with site-specific standards. The period for application of site-specific standards usually is defined as the growing season, and is described in the statement of basis and purpose for that standard. For example,

growing season data are used to determine compliance with standards for phosphorus. Any determination of site-specific standards attainment must be based upon application of such standards in a manner consistent with the applicable control regulation.

e. Portions of segments: If evaluation of a data set for an entire segment does not indicate impairment, but specific location(s) within the segment consistently exceed acute or chronic standards, the specific portion of the segment may be listed.

f. Temporary Modifications: When temporary modifications of numeric standards have been adopted, attainment is assessed against the underlying standard, including those instances where the decision to assign a temporary modification is based specifically upon significant uncertainty as to the appropriate underlying standard (see section 31.7(3)(a)(iii) of the Basic Standards). However, segments with temporary modifications based on uncertainty shall not be subject to the development of a TMDL, and permit limits shall not be based on the underlying standard, until such time as the uncertainty is resolved and the appropriate standard established, if: (1) the Commission has determined that there is an appropriate plan in place to resolve the uncertainty, (2) the Commission has determined that the plan includes an implementation schedule that will resolve the uncertainty in a time frame consistent with Colorado's timeline for the development of TMDLs, and (3) the plan is implemented in accordance with its terms.

g. Sample size: Data sets comprised of three or fewer samples that indicate impairment of the chronic standard will result in placement on the M&E List. Data sets comprised of four to ten samples where there is overwhelming evidence of non-attainment or data is supported by biological or physical evidence indicating non-attainment will result in inclusion on the 303(d) List unless it is determined that the data is not representative (see paragraph below).

h. Overwhelming Evidence: Overwhelming evidence consists of sufficient and credible data that clearly demonstrate that a water body's designated beneficial uses are impaired. Overwhelming evidence is demonstrated when representative data (data that accounts for temporal and spatial variation) indicates an exceedance of numeric water quality standards by more than 50 percent in magnitude or frequency.

i. Sample size - Lakes and Reservoirs: Data demonstrating impairment of numeric standards in lakes and reservoirs must typically include at least two years of sample results (12 sampling events minimum) representative of seasonal and diel variation. Impairment may be demonstrated with a lesser data set in instances where acute conditions result in overwhelming evidence of non-attainment (major fish kills, etc.). Lacking such overwhelming evidence, evidence of non-attainment of standards when demonstrated by fewer data will generally result in placement on the M&E List.

j. Representative Data: Factors to consider when determining whether or not data is representative include: spatial distribution of sampling locations within the water body/segment, temporal variability of the data, changes in the watershed (i.e. changes in predominant land use, presence of new discharges, source removal or remediation projects), age of the data, method detection limits, bias inherent in sampling design, etc.

3. Impairment of Narrative Standards and Classified Uses

Impairment of narrative standards and classified uses may be supported by chemical data and/or information generated by biological and/or physical assessments. In instances

where a determination of impairment is based solely upon biological and/or physical assessments, such assessments must provide clear and convincing evidence of non-attainment. For aquatic life uses, as previously referenced, the Division will generally consider impairment of narrative standards and classified uses to be demonstrated when either the physical/habitat data or biological community metrics reflect a condition that is significantly less than the expected or reference condition. When such data do not indicate specific pollutant(s) causing non-attainment, the Division will recommend placing the segment on the M &E List for further study.

For water supply uses, the Division will consider chemical data, biological and/or physical assessments that provide clear and convincing evidence of non-attainment. Such impairment may be demonstrated by chemical data documented at levels toxic to humans. The Division will utilize Commission Policy 96-2, Human Health-Based Water Quality Criteria and Standards, in any determination of impairment based upon such information. Impairment decisions may also be supported by biological and physical data presenting overwhelming evidence of impairment due to color, taste and odor.

In-situ bioassay, or other ambient toxicity test results which demonstrate statistically significant lethal or sub-lethal adverse effects and which are supported by biological information demonstrating adverse impacts to aquatic community health, composition, or productivity, in comparison to an appropriate reference condition, will result in a decision of impairment. In general, interpretation of toxicity test results will conform to applicable portions of the Laboratory Guidelines for Conducting Whole Effluent Toxicity Tests (WQCD, 1998) and the Biomonitoring Guidance Document (WQCD, 2002). For lakes and reservoirs, impairment may be demonstrated where acute conditions (typically low DO levels) result in significant fish kills. Fish kills associated with accidental spills or isolated unauthorized discharges of toxics will not typically be considered a basis for listing.

4. Listing Based on Fish Consumption Advisories (FCA)

Relative to the use of fish consumption advisories as a basis for listing, the Division is currently in the process of re-examining both the technical bases for, and procedural processes associated with, the issuance of such advisories.

Re-examination of the Fish Consumption Advisory Process will be a cooperative undertaking with the Colorado Division of Wildlife, the Epidemiology Section of the Colorado Department of Public Health and Environment, and other stakeholders. At the present time, the issuance of such advisories is generally the responsibility of Colorado Department of Public Health and Environment, under the same authority as health advisories on Chronic Wasting Disease, Hanta Virus and West Nile Virus. These advisories can be issued without any opportunity for public comment.

Hence, until such time as the aforementioned re-examination is complete, new listing decisions based upon fish consumption advisories shall be made on a case-by-case basis taking into account such factors as: (1) the scientific basis for the advisory, including the adopted action level and the nature and extent of any fish tissue information; (2) the existence of any associated relevant water column and/or sediment data; (3) the risk level associated with the advisory; (4) such other relevant technical information as may be presented to the Division, and (5) consideration of EPA guidance on fish and shellfish consumption advisories (memo, October 24, 2000, signed by Geoffrey Grubbs and Robert Wayland).

Division actions in the interim:

- The Division will continue any current listings of segments/pollutants based on existing FCA.

- Work on new CDPHE FCA Procedures will be initiated.
- Until the new FCA Procedures are final, new waterbodies with FCA will be listed on case-by-case basis only.
- No new TMDLs for FCA-listed waterbodies will be initiated until the new FCA Procedures are finalized.
- Once the new FCA Procedures are finalized, all FCAs will be reviewed for consistency with the new procedures.

IV. PRIORITIZATION FOR TMDL DEVELOPMENT

The Division must ensure that TMDLs are developed for all water bodies and pollutants on the Section 303(d) List. Recognizing that all TMDLs cannot be completed at once and that certain risks may be greater than others, the Clean Water Act section directs the Division to prioritize the waters on the Section 303(d) List. The Division will use the prioritized Section 303(d) List to focus resources to support the development of TMDLs.

A. Prioritization Objective

The objective of the prioritization is to identify where the Division and the public should concentrate their resources. It will also provide useful information to other stakeholders when deciding how to focus their resources. The identification of a high priority segment does not necessarily mean that the TMDL will be developed before any lower priority segments. For some high priority TMDLs, the development may have to await data collection or stakeholder outreach.

B. Assigning Priorities

Priorities are initially based on consideration of the severity of impairment to the use classifications for the segment. Use Classifications are described in "Basic Standards and Methodologies for Surface Water" 31 (5 CCR 1002-8, sec. 31.13). Secondary factors can be used to modify the initial prioritization to an overall or final prioritization. Secondary factors may either elevate a water body into a higher priority group (e.g., endangered or declining native species, public interest, administrative needs) or reduce the priority ranking (e.g., pace of stakeholder group development, CERCLA cleanup action in progress).

1. Severity of Water Quality Impairment

High Priority: Non-supporting for primary drinking water standards, Aquatic Life class 1 cold or warm, or Recreation class 1a.

Medium Priority: Non-supporting for Aquatic Life class 2 cold or warm, or Agriculture

Low Priority: Non-supporting for secondary drinking water standards or Recreation class 1b or 2.

2. Secondary Considerations

- Division action can support a local, regional or federal stakeholder group that is ready to move on to the next step of TMDL development, or there is substantial public interest and support.
- The water body is vulnerable or fragile as an aquatic habitat, or there are aquatic species of special concern present.
- The water body is of particular importance for recreational, economic and aesthetic uses.
- The Division can realize efficiency savings (e.g., synchronizing permits, linking segments within a watershed).

- There are immediate programmatic needs such as waste load allocations for permits that are due to expire or for new or expanding discharges.
- There is a court ordered cleanup or CERCLA action in progress, which will change the contribution of pollutants (this consideration could reduce priority ranking).

XX) Appendices Map

Main Website – Water Quality Control Commission
http://www.cdphe.state.co.us/op/wqcc/wqcchom.asp

- 303(d) / TMDL - http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303(d)/303dtmdlpro.html
- Waterbody Regulations (#32-38) – http://www.cdphe.state.co.us/op/regs/waterqualityregs.asp
- Basic Standards and Methodology for Surface Water (Regulation #31) - http://www.cdphe.state.co.us/op/regs/waterregs/1002311001-0305.pdf
- Status of Water Quality in Colorado – 2004 (305(b) document) - http://www.cdphe.state.co.us/op/wqcc/waterstatus2004/305(b).pdf
- 2002, 305(b) document - http://www.cdphe.state.co.us/op/wqcc/waterstatus2002/305(b)sectionIII22002final.pdf

Appendix A – Found in the 2002 305(b) document, Section III
http://www.cdphe.state.co.us/op/wqcc/waterstatus2002/305(b)sectionIII22002final.pdf
- See page III-15

Appendix B – Tables found in Regulation #31 of Colorado's Water Quality Standards at
http://www.cdphe.state.co.us/op/regs/waterregs/1002311001-0305.pdf
- See pages 30-39 and 48-57

Appendix C – Stream Classifications for each major river basin in Colorado can be found in Regulations 32-38 at http://www.cdphe.state.co.us/op/regs/waterqualityregs.asp
-Example from Arkansas River, regulation #32, page 1

Appendix D - Found in the 2002 305(b) document, Section III
http://www.cdphe.state.co.us/op/wqcc/waterstatus2002/305(b)sectionIII22002final.pdf
- See pages III-12-13

Appendix E – Found on a PDF created by the EPA entitled "Summary of Bioassessment Programs and Biocriteria Development" – Dec. 2002.
http://www.epa.gov/bioindicators/pdf/CO_summary_final.pdf

Appendix F - Found in the 2002 305(b) document, Section III
http://www.cdphe.state.co.us/op/wqcc/waterstatus2002/305(b)sectionIII22002final.pdf
- see pages III-2-3

Appendix G – Found at the 303 (d) and 303 M&E lists, respectively
http://www.cdphe.state.co.us/op/wqcc/OtherRegs/93-94/Final93.pdf
- See page 2
http://www.cdphe.state.co.us/op/wqcc/OtherRegs/93-94/Final94.pdf
- See page 2

Appendix H – Found in the 2004, 303(d) Listing Methodology PDF document
http://www.cdphe.state.co.us/op/wqcc/SpecialTopics/303(d)/303(d)ListMeth2004final.pdf
- See all pages (1-16)

The Clean Water Act: MONTANA

I) DEQ, the Board of Environmental Review, and the State Review Process

The Water Quality Act (WQA) is the primary basis for water quality protection in the state of Montana. In addition to the actual contents of the act, it provides authority for the surface water and groundwater standards (17.30.601 and 17.30.1001 respectively), the mixing zone rules (17.30.501), the nondegradation rules (17.30.701) and the subdivision/on-site subsurface waste water treatment rules (17.36.901 et seq.).

In Chapter 418, Laws of 1995 (SB 234), the Legislature created the Department of Environmental Quality (DEQ) and the Board of Environmental Review, and gave each specific duties under various environmental regulatory statutes. Following is a listing of those statutes and a brief description of the Board's role and responsibilities under those statutes

1) The Board of Environmental Review:

Rules - The Board has authority to adopt:

a) fee rules;
b) substantive rules that:
    i) establish water quality standards;
    ii) classify streams (stream classifications must be reviewed every three years);
    iii) set requirements to prevent significant degradation of water; and
    iv) set standards for treatment of wastes;
c) rules establishing requirements for matching funds for construction of local water pollution control facilities;
d) rules governing loans from the Wastewater Treatment Revolving Fund Act.

Hearings - The Board has authority to hear appeals of:

a) Department permit decisions;
b) Department decisions on requirements for authorization to degrade; and
c) Administrative orders issued by the Department as a result of violations of The Act.

Approval of Local Water Quality Control Program - A local water quality district may adopt a local water quality control program only with approval of the Board.

2) The DEQ:

The Department of Environmental Quality's mission is to protect, sustain, and improve a clean and healthful environment to benefit present and future generations.

Montana Environmental Performance Partnership Agreement (PPA) is an agreement which identifies and explains the key environmental priorities and goals in the State of Montana and the working relationship between the Montana Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA). The 2001-2003 PPA establishes agreements to achieve the goals of the National Environmental Performance Partnership System (NEPPS). The NEPPS provides a framework for delineation of state and EPA roles in carrying out environmental laws in each state. It allows Montana to identify key state priorities, to allocate federal resources to the highest state priorities and to have more flexibility in finding ways to achieve mutually agreed upon goals. EPA seeks to work jointly with the state to find the most effective way to achieve national standards and goals, while meeting state environmental priorities.

This PPA encompasses an agreement for State Fiscal Years 2001-2003 (SFY 2001-2003). The PPA will be reviewed annually and new commitments may be negotiated under the established structure. In any area where new priorities arise, new goals and objectives will be developed, negotiated and added to the PPA as amendments.

For the majority of programs covered by this PPA, the state has the role of primary implementing agency. Some of the roles described above have parallels at the state level.

Roles of the DEQ:

- DEVELOPMENT OF STATE PROGRAM STRUCTURE AND STANDARDS - Montana is responsible through its statutory and regulatory authority to determine the state management structure for the program. In addition, the state adopts its standards through its Administrative Procedures Act and requirements of implementing statutes. The Board of Environmental Review does this in most cases.

- RESEARCH AND DEVELOPMENT - The state may also conduct or fund research and development efforts relevant to its environmental programs. This occurs on a limited basis, however, due to resource constraints.

- PROGRAMMATIC AND TECHNICAL ASSISTANCE - Due to the maturity of many of the programs described in this PPA, the state sometimes provides programmatic and technical assistance to EPA. This is often done through agreements under which the state undertakes lead responsibility for particular projects or activities for which EPA is primarily responsible.

- RESOURCES - The state commits its own financial resources to nearly all of the programs and activities described in this PPA.

- SPECIAL PROJECTS / INITIATIVES - The DEQ may also undertake particular initiatives or projects which are a high priority for the state. The state works with EPA and others to implement those projects or initiatives.

The Department of Environmental Quality is using a watershed approach to facilitate development of water quality restoration plans. DEQ has divided the state into 91

watershed planning areas and adopted a schedule for completing restoration plans for all areas by May 2007.

TMDL Review Process

Section 303(c)(1) of the federal Clean Water Act requires that all states hold public hearings at least once every 3 years for the purpose of reviewing water quality standards and proposing, where appropriate, necessary revisions to water quality standards.

The Montana Department of Environmental Quality (DEQ) and the U.S. Environmental Protection Agency (EPA) have developed the following proposed schedule to develop Total Maximum Daily Loads (TMDLs) for waters on the state's 1996 list of impaired and threatened waters. A Total Maximum Daily Load is a plan to establish the maximum amount of pollutant load that can flow into a waterbody from point sources, nonpoint sources and natural background sources without exceeding state water quality standards. Montana law and federal regulations require DEQ to develop TMDLs for all waters that are not meeting water quality standards. (These waters are referred to as water quality limited segments). TMDLs are required by Section 303(d) of the federal Clean Water Act and by state law. The list of waters needing TMDLs is known as a "303(d) list."

DEQ develops TMDLs on a watershed basis. DEQ has divided the state into 91 TMDL planning areas and has scheduled each area for TMDL plan development based upon groupings of similar water quality problems, land ownership, the 13 ranking criteria listed in MCA §75-5-702(7) and consideration of the priorities assigned to individual waters in the draft Year 2000 303(d) List. The following schedule identifies the date by which TMDLs for all listed waters within each planning area will be or have been completed since 2002.

2002

Columbia Basin
*Big Creek

Upper Missouri
Sun

Lower Missouri
*Missouri Mainstem – Phase 1 EPA
Teton

2003

Columbia Basin
*Bobtail
Flathead headwaters EPA
*St. Regis

Upper Missouri
*Benton Lake
Dearborn EPA
Lake Helena EPA

Ruby
*Upper Madison EPA

Lower Missouri
*Big Spring
Bullwhacker-Dog
*Cutbank-Two Medicine EPA

Yellowstone
*Powder EPA
*Tongue EPA

2004

Columbia Basin
*Grave/Therriault
Middle Blackfoot
*Ninemile
*Prospect Creek
Yaak EPA

Upper Missouri
North Fork Big Hole
Upper Big Hole

Lower Missouri
Big and Little Dry
Flatwillow-Boxelder
Fork Peck

Yellowstone Boulder-Big Timber
Little Missouri
*O'Fallon

2005

Columbia Basin
Bitterroot
Flathead-Stillwater
Nevada Creek
Rock
Tobacco
*Whitefish Lake

Upper Missouri
Jefferson, Upper
Jefferson, Middle
Middle Madison
Missouri-Chouteau
Red Rock, Upper
*Smith, Upper

Smith, Lower
Upper Gallatin

Lower Missouri
*Judith-Arrow
Lower Missouri
Lower Milk – Rock
Redwater

Yellowstone
*Bighorn Lake- Shoshone EPA
Paradise
Rock Creek-Red Lodge
*Shields

2006

Columbia Basin
Fisher
Lower Blackfoot
Lolo

Upper Missouri
Beaverhead
Belt
Middle Big Hole
Lower Big Hole
Upper Boulder

Lower Missouri
Beaver
Marias-Willow Creek
Upper Milk
*Upper-Middle Musselshell

Yellowstone
Clarks Fork-Yellowstone
Stillwater-Columbus
Yellowstone-Sweetgrass
Yellowstone-Lower Bighorn

2007

Columbia Basin
Clark Fork Drummond
Flint
Kootenai
Little Blackfoot
Lower Clark Fork
Middle Fork Clark Fork
Thompson
Upper Clark Fork

Upper Missouri
*Big Otter
Canyon Ferry
East Gallatin
Holter
Lower Red Rock
Lower Madison
*Lower Gallatin
Lower Boulder
Missouri Cascade

Lower Missouri
Landusky
Middle Milk and Tributaries

Yellowstone
Lake Basin- Spidel
Lower Yellowstone
Yellowstone-Rosebud

Triennial Review:

Although this schedule has been created, in reality the DEQ has found it very difficult to keep up with such a schedule. In the year 2000, the DEQ reassessed its 1999 303(d) list to see whether data supported those waterbodies being listed. In some cases, data was available to keep or delist a waterbody. In many cases though, available data was not sufficient to evaluate the stream's health. They are trying to implement monitoring programs to evaluate those streams. In some cases they have already done so, though many remain on the to-do list. Lists of delisted waters and those awaiting assessment are referred to in the following section discussing the 305(b) list.

At this point, the DEQ is evaluating waterbodies based simply on the receipt of new information to trigger an assessment. Keeping up with that has proven difficult, let alone assessing each watershed on a triennial schedule. Since they evaluated all watersheds in the state in 2000, they are at least aware of the areas that need attention. A current plan was put in place in 2000 for Water Quality Assessment Process and Methods, which can be found at
http://www.nris.state.mt.us/wis/TMDLApp/pdf2002/Appendix_A.pdf

TMDL Advisory Group

An important component of implementing TMDLs is assigning priority for TMDL development to Montana's water bodies on the 303(d) list. To aid in this process, HB 546 formed an advisory group to help DEQ develop a method of ranking water bodies in order to prioritize them as high, moderate or low for TMDL development. The 1999 legislature broadened the scope of the group to general review and oversight of DEQ's TMDL program. The advisory group is one example of how DEQ will solicit input from outside of the agency to implement TMDLs.

The fourteen member group represents a broad base of water related interest groups in Montana. The groups represented are agriculture (livestock and farming), conservation

or environmental interest, water-based recreationists, the forestry industry, municipalities, point source dischargers, mining, federal land management agencies, state trust land management agencies, supervisors of soil and water conservation districts for counties both west and east of the continental divide, the hydroelectric industry, and fishing related businesses.

The advisory group was selected by soliciting nominations from members of each interest group. When there was more than one nominee, each interest group was asked to confer and agree on a representative.

Public Notice of Proposed Changes

1) Before streams are classified or standards established or modified, the board shall hold a public hearing.

2) Notice of the hearing specifying the waters concerned and the classification, standards or modification of them shall be published at least once a week for three consecutive weeks in a daily newspaper of general circulation in the area affected.

3) Notice shall also be mailed directly to persons the department believes may be affected by the proposed action.

4) The water pollution control advisory council shall be given not less than 30 days prior to first publication to comment on the proposed action.

5) The general rules of procedure found in ARM 17.4.101 relating to rulemaking will be followed. (History: 75-5-201, MCA; IMP, 75-5-307, MCA; Eff. 12/31/72; TRANS, from DHES, 1996 MAR p. 1499.)

II) Contacts

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To get on an agency's mailing list for:

Proposed Water Quality Rule Changes
Carol Gilmore
(406) 444-6697
cgilmore@state.mt.us

NPDES Permits
Karen Anthony
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kanthony@state.mt.us
-Montana is delegated permit authority (Not EPA)

Triennial Review Hearings
Chris Levine
(406) 444-0371
clevine@state.mt.us

III) List of Designated Uses

Waterbodies or segments of waterbodies in Montana are classified according to their suitable uses which are listed below.

1) 17.30.622 A1 Classification Standards Suitable for drinking, culinary and food processing purposes after conventional treatment for removal of naturally present impurities. Water quality must be suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life; waterfowl and furbearers, and agricultural and industrial water supply.

2) 17.30.623 B-1 Classification Standards
Suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

3) 17.30.624 B-2 Classification Standards
Suitable for drinking, culinary and food processing purposes, after conventional

treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

4) 17.30.625 B-3 Classification Standards
Suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

5) 17.30.626 C-1 Classification Standards
Suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

6) 17.30.627 C-2 Classification Standards
Suitable for bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply.

7) 17.30.629 C-3 Classification Standards
Suitable for bathing, swimming and recreation, growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers. The quality of these waters is naturally marginal for drinking, culinary and food processing purposes, and agricultural and industrial water supply.

For scored levels of sufficient data needed to attain designated uses see Appendix A

IV) Water Quality Classified Uses and Antidegradation Policy

The Water Protection Bureau (WPB) is responsible for implementation of Montana's nondegradation regulations. For Montana's Antidegradation Policy and Water Quality Classified Uses see the document entitled "Antidegradation Policies by State."

V) Basic Standards / Criteria

Definitions:

"Acutely toxic conditions" means conditions lethal to aquatic organisms passing through the mixing zone. Lethality is a function of the magnitude of pollutant concentrations and the duration of organism exposure to those concentrations.

"Mixing zone" means the area of a water body contiguous to an effluent with characteristics qualitatively or quantitatively different from those of the receiving water. The mixing zone is a place where effluent and receiving water mix and not a place where effluents are treated. Certain water quality standards may not apply in the mixing zone for those parameters regulated by a MPDES or NPDES permit. An effluent, in its mixing zone, may not block passage of aquatic organisms nor may it cause acutely toxic conditions, except that ammonia, chlorine, and dissolved oxygen

may be present at concentrations so as to cause potentially toxic conditions in no more than 10% of the mixing zone provided that there is no lethality to aquatic organisms passing through the mixing zone. The area in which these exceedences may be allowed shall be as small as practicable. Provisions for specific mixing zones will be determined on a case-by-case basis by application of the department's surface water mixing zone rules in ARM 17.30.501 through 17.30.518.

"Chronic toxicity" means that death or functional impairment occurs or can be expected to occur to organisms exposed for periods of time exceeding 96 hours.

Numeric standards that vary with use classifications, including fecal coliforms, color, turbidity, pH, and temperature, are given in the surface water quality standards (17.30.620 through 17.30.637 of the Administrative Rules of Montana [ARM]). The surface water quality standards and the ground water standards (ARM 17.30.1001 through 17.30.1045) also contain narrative standards.

- For Standards of Organic Chemicals, Radioactive Materials, Physical, Biological, Inorganic, and Metals Standards see Circular WQB-7; p 4-38 at http://www.deq.state.mt.us/wqinfo/Circulars/WQB-7.PDF

- For an example of the Basic Standards format see Appendix B

- For Stream Classification Narrative and Numeric Criteria for all waterbodies throughout Montana see Chapter 30: Water Quality; Subchapter 6: Surface Water Quality Standards and Procedures; p 6-29 (Surface and Groundwater Quality Standards and Classifications: (ARM 17.30.601 through 641)
- http://www.deq.state.mt.us/dir/Legal/Chapters/CH30-06.pdf

- For Stream Classification Narratives and Numeric Criteria see Appendix C

VI) Assessment Protocols Used to Determine Standards

Narrative standards apply to substances or conditions for which sufficient information does not exist to develop specific numeric standards. Narrative standards include alkalinity, chloride, hardness, sediment, sulfate, total dissolved solids and nutrients (for surface water) and any other substance or condition that may impair the uses of surface or ground water. These standards were developed to comply with the Montana Water Quality Act requirement that standards be adopted to protect the present and future most beneficial uses of state waters (75-5-301, MCA). The Federal Clean Water Act (CWA) requires states to adopt numeric water quality standards for priority toxic pollutants (PP) for which EPA has issued CWA section 304(a) criteria guidance and whose presence or discharge could reasonably be expected to interfere with designated uses. In addition, the Montana Agricultural Chemical Ground Water Protection Act (80-15-201, MCA) requires the adoption of ground water standards for a selected list of pesticides. The standards for aquatic life are based on the most recent PP criteria.

1) The standards in this subchapter are adopted to establish maximum allowable changes in surface water quality and to establish a basis for limiting the discharge of pollutants which affect prescribed beneficial uses of surface waters.

2) The surface water quality standards are composed of all rules of this subchapter.

3) The provisions of ARM 17.30.635 through 17.30.637, 17.30.640, 17.30.641, 17.30.645 and 17.30.646 apply to all surface waters unless they conflict with ARM 17.30.620 through 17.30.629 in which case the requirements of ARM 17.30.620 through 17.30.629 prevail.

4) The standards of this subchapter are applicable where these standards are or would be violated by discharges to ground water. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1992 MAR p. 2064, Eff. 9/11/92; TRANS, from DHES, 1996 MAR p. 1499.) Rules 17.30.604 and 17.30.605 reserved

VII) Stream Segmentation System

Watersheds in Montana are segmented for water quality management according to their designated use classifications and water quality. These use classifications are shown above in III) List of Designated Uses (i.e. A1, B1, B2).

- For an example of stream segmentation in Montana see Appendix C

VIII) Treatment of Water Column

The quality of the water column is subject to both narrative and numeric standards as listed above in V) Basic Standards/Criteria and shown in Appendix B. These criteria are applied to sections of watersheds based on their use, as shown in Appendices C and D.

For Sufficient Chemical/Toxicity Credible Data Decision Tables for Aquatic Life Use see Tables 2 & 5 in the 2000 Water Quality Assessment Process and Methods found in Appendix A

IX) Treatment of Physical Habitat

Physical Habitat is evaluated for its ability to support aquatic life.

The aquatic life beneficial use is a broad descriptor intended to protect fish, invertebrates, aquatic plants, and associated wildlife. All of the water classes defined under the Montana Water-Use Classification system require that the rated waters support the beneficial use of "growth and propagation of fishes and associated aquatic life waterfowl and furbearers" (ARM 17.30.604-624). The aquatic life/fisheries SCD tables (Tables 1-3 for streams and Tables 4-6 for lakes) provide a systematic but flexible approach for making decisions concerning the level of information required for aquatic life beneficial use-support determinations. It is a holistic approach entailing consideration of data from the following three data categories: (1)Physical habitat (2)Biology (see (X) below) (3) Chemistry/toxicity (see Standards).

Physical/habitat – includes qualitative and/or quantitative riparian and aquatic vegetation information, and hydrogeomorphic characteristics and functions. For example, data may include stream reach habitat surveys with photos to document impairments, and physical measurements of the stream channel, such as pebble counts and channel cross

For Sufficient Physical/Habitat Credible Data Decision Tables for Aquatic Life Use see Tables 3 & 6 in the 2000 Water Quality Assessment Process and Methods found in Appendix A

X) Treatment of Sediment

The criteria for sediment loads are included in the Basic Standards found in the Circular WQB-7 (example in appendix D).

XI) Treatment of Biological

Biology – includes chlorophyll *a* data; and aquatic biological assemblage data relating to fish, macroinvertebrates, and algae; and wildlife community characteristics. Measurements often include population estimates, biomass, number and relative abundance of sensitive or pollution-tolerant species, diversity, and distribution.

The Montana Department of Environmental Quality (DEQ) strongly encourages the use of biological data for making ALUS determinations (more than 90% of MT's 303(d) assessments include biological data). It is very difficult to acquire sufficient credible data in Montana without having biological data; thus the incorporation of bioassessment in DEQ's monitoring program is very important. DEQ is in the second year of collecting macroinvertebrate and periphyton data from fixed station sites that are located on major streams throughout Montana. The primary objective is to determine status and trends. In 2002, the Department initiated an effort to develop vegetation assessment tools for assessing the biological conditions of riparian areas and wetlands and is also looking at amphibians. In the past, wetland macroinvertebrate and diatom communities have been assessed.

DEQ collaborates with a number of agencies and organizations. The Montana Bureau of Land Management has helped fund DEQ's statewide biological monitoring efforts. USGS is collecting chemistry data at most fixed station sites. The Department is also working closely with the wetlands program, universities and the Montana Natural Heritage Program to assess riparian zones. For 303(d) purposes DEQ has collaborated with conservation districts, the Natural Resource Conservation Service, USFS, and USEPA, among others.

In 2000 DEQ developed a new listing methodology that strongly encourages the use of biological data to assess waters for 303(d) purposes. The Department was required to use this methodology for all waters that were previously listed as impaired, but were unfortunately not required to use the new listing methodology for streams that were previously listed as fully supporting ALU. Montana DEQ is also currently forming

workgroups to begin the process of developing a state-wide water quality database that can be accessed by federal and state agencies in Montana.

Some challenges include achieving access to private lands and assessing prairie streams that are located in eastern Montana. In the future DEQ intends to develop and implement a random study design to assess the biological condition of smaller order streams.

Biological criteria are for Montana waters are narrative: "suitable for salmonids and associated aquatic life" etc. The state agency is in the process of developing more specific standards. At this point it is not possible to state the degree to which they will be numerically quantified. Expected adoption date is 2005.

For Sufficient Biological Credible Data Decision Tables for Aquatic Life Use see Tables 1 & 4 in the 2000 Water Quality Assessment Process and Methods found in Appendix A

For an overview of Montana's Biological Assessment, see Appendix E

XII) Treatment of Wetlands

For information on the Treatment of Wetlands in Montana, see a separate document entitled "Treatment of Wetlands by State."

XIII) 305b Reports

Section 305(b) of the Clean Water Act requires that states, territories, and jurisdictions assess their water quality biennially and report those findings to the U.S. Environmental Protection Agency (EPA). EPA then summarizes the findings in a national water quality inventory. It is important to note that this report is no longer a Report to Congress, pursuant to Public Law 104-66, the Federal Reports Elimination and Sunset Act of 1995. To assess water quality, states and other jurisdictions compare their monitoring results to the water quality standards they have set for their waters. Water quality standards consist of three elements: the designated uses assigned to waters (such as drinking, swimming, or fishing), criteria to protect those uses (such as chemical-specific thresholds that should not be exceeded), and an antidegradation policy intended to keep waters that *do* meet standards from deteriorating from their current condition.

The Montana 2002 305(b) list can be found at
http://www.nris.state.mt.us/wis/environet/2002_305bhome.html

It is an interactive database containing all Montana surface waters included in the state water quality assessment database. For each waterbody basic geographic information is provided and the beneficial uses which the water is required to support are indicated. For those waters which have been assessed as being impaired, the specific uses identified as impaired are indicated along with the probable causes and sources of impairment. Maps of the waterbodies may be viewed and links to assessment record sheets for each water are provided.

Also at http://www.nris.state.mt.us/wis/environet/2002_305bhome.html Appendix B lists waterbodies from the 2000 list that were delisted in 2002 and why. Appendix F lists previously listed waters requiring reassessment.

This data is compiled into a National Water Quality Inventory biennially. The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

The 2002 National Water Quality Inventory is the latest report available and can be accessed at http://www.epa.gov/305b/2000report/alhi.pdf

XIV) 303d lists

Section 303(d) of the federal Clean Water Act (and related regulations requires states to assess the condition of their waters to determine where water quality is impaired (does not fully meet standards) or threatened (is likely to violate standards in the near future). The result of this review is the 303(d) list, which must be submitted to the EPA every other year. Section 303(d) also requires states to prioritize and target water bodies on their list for development of water quality improvement strategies (i.e. TMDLs), and to develop such strategies for impaired and threatened waters.

The following is the process for assessing water quality in Montana, adopted by the DEQ in 2002. It can be found at
http://www.nris.state.mt.us/wis/TMDLApp/pdf2002/Appendix_A.pdf

The assessment of streams, lakes and wetlands to identify "impaired" waters for inclusion on the 303(d) List is an important step in a process intended to ensure that all waterbodies in the state will have water quality adequate to support all of their intended beneficial uses. The process has been developed and shaped by legal mandates, water quality standards, the tools and techniques of water quality monitoring, the availability of information, and the funds and administrative resources that can be devoted to assessment efforts.

In overview, the main steps of this process in Montana are:

1) State waters are classified under a system that identifies the beneficial uses that each waterbody will be expected to support. State waters in Montana initially were classified in 1955 and the system has been substantially modified over the years.

2) State water quality standards identify the specific water quality conditions that must be met for a waterbody to support each beneficial use.

3) Many entities and organizations collect data (for many different reasons) which indicate the quality of waters and their compliance with the applicable water quality standards.

4) The Department of Environmental Quality (DEQ) searches out the available data and identifies waterbodies for which there are "sufficient credible data" to make valid and reliable determinations of beneficial use support.

5) When sufficient data are available for a waterbody, DEQ compares the data with water quality criteria and guidelines to make "beneficial use-support determinations." Waterbodies that do not fully support all uses designated under the standards are placed on the 303(d) List of impaired waters.

6) Waters on the 303(d) List are prioritized and scheduled for the development of plans to correct their impaired condition. (Additional data may be collected before planning starts to verify existing conditions or to further identify the causes and sources of impairment).

7) Plans are developed for waterbodies on the 303(d) List identifying actions that will be taken to improve water quality so that the waterbody can fully support the applicable beneficial uses.

8) Planned actions are implemented and monitoring is done to ensure that water quality improves at least as much as necessary for the waterbody to fully support its beneficial uses.

9) This appendix focuses on steps 4 and 5 from the above list, discussing in detail the process and methods employed by Montana DEQ to accomplish these two steps. To provide background information for the discussion of Steps 4 and 5, an overview will first be provided of Steps 1-3. Steps 6-8 are addressed in the relevant DEQ water quality planning documents.

For the 2002 Montana 303(d) list, go to http://nris.state.mt.us/wis/environet/2002_303dhome.html. This menu item leads to an interactive database containing all Montana surface waters which have been assessed as having one or more beneficial uses impaired or threatened as a result of human activity. For each waterbody the uses identified as being impaired are indicated along with the probable causes and sources of impairment. Maps of the waterbodies may be viewed and links to assessment record sheets for each waterbody are available. The user can use the interactive query capability of the database to format the data display to serve his or her needs.

For an example of a full report of a stream on the 303(d) list accessible from this site see Appendix G

XV) Assessment protocols for listing and delisting

EPA will review and approve, partially approve/disapprove, or disapprove state or territorial 303(d) lists of impaired and threatened waters requiring a TMDL (Category 5). EPA's review and approval of the 303(d) list will be based on a determination that the state's or territory's assessment and listing methodology was used to prepare the list, that the assessment and listing methodology is scientifically sound, that it is consistent with the state's or territory's water quality standards, and that the state or territory reasonably considered all existing and readily available data and information, and listed

all waters not attaining water quality standards. Upon completing its review of the 303(d) list, EPA will send a letter to the state or territory notifying it of full approval, partial approval/disapproval, or disapproval. If the list is partially approved/disapproved, or disapproved, EPA will develop a list for the state or territory. EPA will also provide 30 days for public comment on the EPA developed list.
Based on this legislation and the applicable sections of the federal Water Quality Act, DEQ has adopted the following principles for the development of the 303(d) List:

- DEQ shall consider all currently available data, including information or data obtained from federal, state, and local agencies, private entities, or individuals with an interest in water quality protection.
- DEQ shall develop guidelines that can be used to assess the validity and reliability of the data used in the listing and for making beneficial use-support determinations. A data management system will be used to track and document the data sufficiency and beneficial use support determinations.
- DEQ shall use the guidelines in making all additions to or deletions from the 303(d) List. The data and information used in making any changes in the 303(d) List will be available for public review.

- DEQ will monitor and reassess all waterbodies that are removed from the 303(d) List due to the lack of sufficient credible data during the following field season or as soon as possible thereafter.

Implementing these principles involved developing and documenting guidelines for the sufficient credible data and beneficial use determinations. First, DEQ reviewed general EPA guidelines for making beneficial use determinations and refined them into a beneficial use-support assessment process applicable to Montana. Next, DEQ identified the data required for this assessment process and drafted guidelines for evaluating data validity and reliability. These initial guidelines for sufficient credible data and beneficial use determination were then subjected to an intensive, iterative process of review and refinement to produce the final methodology first used to develop the 2000 303(d) List. That methodology, essentially unchanged, continues in use and is described in the following pages.

For each waterbody, the entire review is documented on Assessment Record Sheets so anyone can examine the basis and rationale for the DEQ decisions. Reports and other data sources considered in the reviews are identified and the documentation shows how the available data are assessed to determine if they are sufficient and credible for making beneficial use-support determinations. The rationales for use-support determinations are documented by means of rating tables and assessor's comments. Finally, the assessment methods employed for making the use-support determinations are recorded and the probable causes and sources of impairment are identified.

For further documentation of Montana's 303(d) listing and delisting protocol see Appendix H.

XVI) Assessment for National Point Source Discharge Elimination System (NPDES) permits

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

Montana is a delegated permit authority. The goal of the Montana Pollutant Discharge Elimination system (MPDES) program is to control point source discharges of wastewater such that water quality is the receiving streams are protected. Levels of water quality that are required to maintain the various beneficial uses of the receiving streams are set forth in the Water Quality Standards (WQS).

> The program is funded by application and annual permit fees. Activities of program staff include public education, reviewing applications, determining effluent limits and best management practices, environmental assessments, public participation and information retrieval, effluent and instream data review and management, field inspections, enforcement, regulation and guidance preparation, program planning and administration.

The Water Protection Bureau (WPB) implements Montana's water quality laws and the delegated NPDES program pertaining to permitting of surface and groundwater discharges in full compliance with the requirements of 40 CFR Parts 122-124, the delegation memorandum of agreement, and inspection plans. This includes Montana's nondegradation and stormwater permitting programs, as they pertain to municipalities, industries, and subdivision development. WPB evaluates permit applications, conducts permit maintenance and inspection activities, and provides compliance assistance to ensure beneficial uses of surface and ground waters throughout the state.

The WPB also coordinates closely with the EPA to ensure program quality and maintenance of Montana's delegated authority.

The WPB priorities for Fiscal Years 2002-2003 include increased emphasis on effective and efficient permitting using existing resources. These resources include 24 FTE (Full Time Equivalent [employees]) organized into Water Permitting and Subdivision Sections. Water Permitting is further organized in Montana Pollutant Discharge Elimination System (MPDES), Groundwater, Stormwater, and Nondegradation programs.

To increase its efficiency and effectiveness, WPB plans to develop additional general permits and be actively involved in policy and rulemaking processes, which will facilitate these goals. In the 2002–2003 timeframe two major rulemaking efforts will be emphasized: 1) Storm Water Phase II and 2) Subdivisions Review rules and technical circulars. WPB will also continue to coordinate closely with the DEQ's Planning Prevention and Assistance Division regarding total maximum daily loads (TMDL).

XVII) Resources

River Network: http://www.rivernetwork.org/index.cfm

State-by-State Clean Water Act: http://www.rivernetwork.org/cleanwater/cwa_search.asp

National Water Quality Control Council (NWQCC); data comparability and collaboration: http://wi.water.usgs.gov/pmethods/mdcbfs.pdf

NWQCC minimum list of metadata elements: http://wi.water.usgs.gov/pmethods/elements/list.htm

Montana's Department of Environmental Quality: http://www.deq.state.mt.us

Montana's Water Quality Act: http://www.deq.state.mt.us/wqinfo/Laws/WaterQualityAct.pdf

Surface and Groundwater Quality Standards and Classifications: (ARM 17.30.601 through 641) http://www.deq.state.mt.us/dir/Legal/Chapters/CH30-06.pdf

Circular WQB-7 Montana Numeric Water Quality Standards: http://www.deq.state.mt.us/wqinfo/Circulars/WQB-7.PDF

Water Quality Standards, Subchapter 7: Nondegradation Policy:
For a copy of the *National Water Quality Inventory:2000 Report* (EPA-841-R-02-001), visit www.epa.gov/305b or call the EPA's National Service Center for Environmental Publications at 1-800-490-9198

2000 Water Quality Assessment Process and Methods: http://www.nris.state.mt.us/wis/TMDLApp/pdf2002/Appendix_A.pdf

Year 2001 305(b) Report Database and Year

2002 Montana 303(d)list http://nris.state.mt.us/wis/environet/2002_303dhome.html

Montana Natural Heritage Program homepage: http://nhp.nris.state.mt.us/

EPA National TMDL home page: This site provides an overview of the national TMDL program with links to pertinent information on state programs. It includes information on TMDL laws and regulations, policies, documents, examples of TMDLs, and more. www.epa.gov/owow/tmdl

EPA Region 8 TMDL program: This site provides specific information on TMDL programs in EPA Region 8 (Montana, Wyoming, North Dakota, South Dakota, Colorado, and Utah). www.epa.gov/Region8/water/tmdl/index.html

EnviroNet: Montana Water Quality Assessment Information in an interactive map format. EnviroNet conveys information about the quality of Montana's rivers, streams, lakes, and wetlands in relation to the Montana Water Quality Standards. Specifically, it displays the results of water quality assessments made on the basis of available water monitoring data.
www.nris.state.mt.us/wis/environet

Montana DEQ Nonpoint Source Program: The Montana Nonpoint Source Program protects and restores water quality through the management of nonpoint sources of pollution such as grazing, farming, mining, construction, logging, and many other activities.
www.deq.state.mt.us/wqinfo/nonpoint_source_program.asp

Natural Resource Information System (NRIS) Water Information: The Water Information System is the starting point for locating water resources information in Montana, such as data on surface water, groundwater, water quality, riparian areas, water rights, climate data and more.
www.nris.state.mt.us/wis

The Montana Water Center: The Montana Water Center at Montana State University advances water research, information, education, and problem-solving partnerships throughout the state and more widely. For more about what they do, visit their website.
www.water.montana.edu/mwc/default.htm

The Montana Volunteer Water Monitoring Project: This organizations aim is to promote knowledge and stewardship of aquatic resources by teaching local citizen volunteers the skills needed to gather accurate, non-biased water quality information.
www.nris.state.mt.us/wis/volwatmon.htm

Montana Watershed Groups: This link provides detailed information about most of the watershed groups in the state including maps, history and background, and major issues.
water.montana.edu/watersheds2/groups/UDBrowseGroups.asp

Water Events and Meetings: This link takes you to a list of events in Montana happening right now or coming up in the near future.
water.montana.edu/resources/events/default.asp

Adopt Your Watershed: Learn about organizations active in your watershed! Over 4,000 watershed groups are listed. Also includes tools and resources to help new groups get started. Visit EPA's Adopt Your Watershed site at www.epa.gov/adopt/

Surf Your Watershed: This site provides multi-level water resource information. Enter your zip code and learn the facts about your watershed and ways you can get involved. Visit EPA's Surf Your Watershed site at www.epa.gov/surf

XVIII) Glossary

Acronyms

- ALUS – Aquatic Life Beneficial Use Support
- ARM – Administrative Rules of Montana

- BLM – Bureau of Land Management
- CWA – Clean Water Act
- DEQ – Department of Environmental Quality
- EPA – Environmental Protection Agency
- FTE – Full Time Equivalent (employee)
- MPDES – Montana Pollutant Discharge Elimination System
- NEPPS – National Environmental Performance Partnership System
- NPDES – National Pollutant Discharge Elimination System
- NRIS – National Resource Information System
- PPA – Performance Partnership Agreement
- PP – Priority Toxic Pollutants
- SCD tables – Sufficient Credible Data Tables
- TMDLs – Total Maximum Daily Loads
- USGS – United States Geological Survey
- USFS – United States Forest Service
- WPB – Water Protection Bureau
- WQA – Water Quality Act
- WQS – Water Quality Standards

Clean Water Act Words (Section 1)

Regular font definition found in state documents, italic font definitions not directly found in state documents and thus might be different

- Aquatic Vegetation – *vegetation that occurs within or depends upon surface water, such as certain species of algae, periphyton and other diatoms.*

- Benthic Macroinvertebrates (Invertebrates) – *organisms that reside the majority of their life cycle on the bottom of running water ecosystems such as rivers. Some benthic taxa are also found in wetland and lake environments. These organism are excellent indicator species, they are easy and cheap to collect and are exposed to pollutants and environment in a variety of life cycles. Some states have biological macroinvertebrate criteria, but Colorado does not at this time.*

- Clean Water Act – *The national 1972 Legislation that provides the tools and guidelines to protect designated uses of water in our nation. Each state has its own version of this act. The goal of this act is to have all waters of the nation be swimmable and fishable (biological integrity) through its funding, criteria and guidance. Each state has a designated body to implement the CWA, usually it is a department of quality, environment or health. This entity or states can also chose to have the USEPA implement all or aspects of the CWA within that state*

- Diatoms – *any of various microscopic one-celled or colonial algae of the class Bacillariophyceae, having cell walls of silica consisting of two interlocking symmetrical valves.*

- Effluent – *something that flows out of or forth, point source discharges are effluents that flow from a discrete pipe or conduit and are regulated under the NPDES permit system* Ground Water – *are subsurface waters in a zone of saturation which are or can be brought to the surface of the ground or to surface waters through wells, springs, seeps or other discharge areas.*

- Hydrogeomorphic Characteristics – *variables or parameters that which pertains to the study, understanding or characterization of how hydrology configures a water body shape or surface configuration.*

- Mixing Ground Rules – *regulations that determine how pollutants will be regulated in a mixing zone. A mixing zone is the space and time it takes for two water bodies to fully mix once one flows into the other.*

- Nondegradation Rules – *regulations that guide the process to control any or further degradation to a water body designated use.*

- Non Point Source Pollution - *contamination or potential contamination that emanates from an diffuse source, a source that cannot be narrowed to one precise point. All "non-point" sources are voluntarily regulated in comparison to point sources that are regulated under the National and State NPDES permit program.*

- Periphyton – *sessile organisms, such as algae and small crustaceans, that live attached to surfaces projecting from the bottom of a freshwater aquatic environment.*

- Point Source Pollution – *contamination or potential contamination that emanates from an identifiable source, such as a pipe or storm drain. All of this "point" sources are regulated under the National and State NPDES permit program.*

- Pollution-tolerant species – *a species that relative to others is more tolerant to a specific pollutant.*

- Riparian Vegetation –*the green corridor of vegetation that is adjacent to a surface water body such as a river, stream, lake or reservoir and serves as an ecotone, or specific ecological zone/community between the water and upland ecosystems.*

- Subdivision/on-site subsurface waste water treatment rules – *rules and guidelines designed to control potential pollutants from waste water treatment systems that are below the surface and associated with a volume of units that are less than a public funded primary, secondary or tertiary treatment plant.*

- Surface Water – water on the earth's surface including, but not limited to, streams, lakes, ponds, and reservoirs; and irrigation and drainage systems discharging directly into a stream, lake, pond, reservoir or other surface water. Water bodies used solely for treating, transporting or impounding pollutants shall not be considered surface water.

- Triennial Review Process – *Federal and Montana Clean Water Act requires that criteria, designated uses and segmentation are reviewed for each major basin in a three year rotating cycle (hence triennial review).*

- Turbidity – means a condition in water or wastewater caused by the presence of suspended matter resulting in the scattering and absorption of light rays.

- Water Column – *that part of a stream, lake, reservoir or wetland that is standing water between the air surface and waterbody substrate.*

- Water Quality Standards – *means a narrative and/or numeric restriction established by the Commission applied to state surface waters to protect one or more beneficial uses of such waters. Whenever only numeric or only narrative standards are intended, the wording shall specifically designate which is intended.*

Antidegradation Policy for Montana CWA (Section 2)

- ARM – Administrative Rules of Montana

- EIS – Environmental Impact Statement/Study

- High Quality Waters – means all state waters, except:

    a. ground water classified as of January 1, 1995, within the "III" or "IV" classifications established by the board's classification rules; and

    b. surface waters that:

        - are not capable of supporting any one of the designated uses for their classification; or
        - have zero flow or surface expression for more than 270 days during most years.

- ONWRs – Outstanding National Resource Waters, means

    a. state surface waters located wholly within the boundaries of areas designated as national parks or national wilderness areas as of October 1, 1995; or

    b. other surface waters or ground waters classified by the board under the provisions of 75-5-316 and approved by the legislature.

Montana Wetlands (Section 3)

- Ecoregions – ecological regions within the state that are distinguished by specific vegetation types that occur primarily in those regions.

- Ephemeral Conditions – *water bodies that do not have continuous surface flow in space or time, creating an associated aquatic life assemblage adapted to periods without surface water.*

- Hydrogeomorphology –*that which pertains to the study, understanding or characterization of how hydrology configures a water body shape or surface configuration.*

Development of Biocriteria for Wetlands in Montana (Section 3)

- ANSP – The Academy of Natural Sciences of Philadelphia

- Anthropogenic stressors – *stressors that act upon a water body or aquatic communities that originate from human sources or activities.*

- Biocriteria – *similar to water quality criteria, but criteria that is biologically based versus chemically based that if met implies the aquatic life designated use is in attainment and that the water body is fishable, or has a community that displays biological integrity. Biocriteria can be developed on a continuum of protection levels just as chemical criteria have been.*

- DEQ – Department of Environmental Quality

- DCCA –Detrended Canonical Correspondence Analysis

- DHES – Department of Health and Environmental Sciences

- GIS – Geographic Information System

- MNHP – Montana Natural Heritage Program

- Multivariate Analysis – *an analytical tool, with the proper study design can help provide metrics to serve as biocriteria. The tool involves compiling and analyzing variety of biological community structure and function indicators with physical, chemical and human disturbance variables.*

- Narrative Criteria – *The suitable described condition of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control Commission. These are more difficult to enforce because they tend not to provide a clear threshold and can contain ambiguous terminology.*

- Numeric Criteria – *The suitable limit (numeric level) of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control Commission.*

- POET – Plecoptera, Odonata, Ephemeroptera, and Tricoptera Macroinvertebrate families

- TWINSPAN – Two-way indicator analysis
- Wetlands – *see Montana's Regulation for specific wetland types and associated definitions; there are definitions for wetland types that are used in regulation versus scientific definitions.*

XIX) Appendices

Appendices A through H are referenced the throughout the previous chapters of this document. Sources of the information and the associated websites are listed in chapter XX.

Appendix A
Designated Uses

Table 1. Biology Sufficient Credible Data Decision Table for Aquatic Life Use (Streams)

Score	Technical Components	Spatial/Temporal Coverage	Data Quality	Data Currency
1	-Visual observations of biota were made with no true assessment - Simple documentation. - Unable to make a comparison to reference condition. - Relative abundance data of fish that are not supplemented with quantitative data or can not be interpreted by a biologist. - Fish creel surveys with limited supplemental information.	- very limited monitoring - data are extrapolated from other sites	-Data precision and sensitivity is very low or unknown. - Qualified professional does not provide any oversight. - Poor taxonomic resolution	- Data are not relevant; biological communities may have changed significantly since the assessment was made.
2	- Only one assemblage was assessed (e.g., RBP Protocols). - Probable sources and causes of impairment are documented. - Reference condition can be approximated by a professional scientist. - Relative fish abundance data that can be interpreted by a qualified professional or also includes quantitative fish density.	-Limited to a single sampling - Limited sampling for site-specific studies	- Data precision and sensitivity are low to moderate. - Data were collected following appropriate protocols; however individuals had limited training. - Qualified professional provided oversight. - Good taxonomic resolution.	- It is unlikely that the biological communities have changed significantly since the survey was conducted.
3	- Two assemblages assessed or one assemblage with quantitative (e.g., biomass) measurements also made following standard operating procedures (SOPs). - Often includes biotic index interpretations. - Fisheries data often includes information about growth rates, age class and condition; The entire fish assemblage is targeted. - Reference condition can be determined with a reasonable degree of confidence and used as a basis for assessment.	-Monitoring normally occurs during a single season. - Monitoring may include site specific studies; However, also has limited spatial coverage of the stream reach.	- Data have moderate precision and sensitivity. - Qualified professional performs survey or provides training; the individual making the survey is well trained. - Qualified professional performs the survey. - Detailed taxonomic resolution	- Data were collected recently or it is very unlikely that the biological community has changed significantly since the survey was conducted.
4	-Two or more assemblages assessed and often includes quantitative measurements following SOPs. -Reference condition is well understood and is used as the basis of the assessment. -Often includes biotic index interpretations	-Surveys conducted for multiple years and/or seasons - Broad coverage of sites - Often uses targeted or probabilistic design	-High precision and sensitivity. -Assessment performed by a highly experienced qualified professional.	-Data are current; there is no doubt that the biological survey reflects current conditions.

Table 2. Chemistry/Toxicity Sufficient Credible Data Decision Table for Aquatic Life Use (Streams)

Score	Technical Components	Spatial/Temporal Coverage	Data Quality	Data Currency
1	-Best professional judgment based on land use data or source locations - Chemical parameters analyzed are limited and do not provide sufficient information concerning probable causes of impairment.	- Low spatial and temporal coverage - limited data at critical periods - Limited period of record (e.g. one day)	-Data precision and sensitivity is very low or unknown and data appear to be an outlier (suspect). - High detection limits make the data difficult or impossible to interpret. QC protocols indicate contamination, etc. QA/QC protocols were not followed.	-Data do not reflect current conditions.
2	- Usually grab or composite water quality samples - Synthesis of historical information on fish contamination levels -Screening models based on loading data (not calibrated or verified) - Sediment contamination data (e.g., metal scans) -Limited chemical parameters ; however probable impairment causes are targeted and probable sources of impairment documented. - Reference condition can be approximated by a professional. -Acute or Chronic WET; or Acute ambient; or acute sediment tests	-Moderate spatial and/or temporal coverage.. -Data collected at critical periods (e.g., spring, summer, spawning season) -Short period of record but good spatial coverage -Quarterly sampling	- Data quality and sensitivity are low to moderate. - Data were collected following appropriate protocols but individuals had limited training. - Low detection limits -QC indicates there was no contamination, etc. -low replication used for toxicity tests	- Data are substantially older than ideal, but appear to be a reasonable indicator of current conditions.
3	- Series of grab or composite samples (diurnal coverage as appropriate) - Calibrated models - Width/depth integrated sampling - Combination of two or more analyses of the following: water column, sediment, chlorophyll; toxicity testing; bioaccumulation data (e.g., fish consumption advisory data). -Reference condition can be determined with a reasonable degree of confidence and used as a basis for assessment. -2-3 Acute or Chronic Ambient; or Acute sediment; or Acute and Chronic WET tests for effluent dominated system	-Broad spatial and temporal coverage of site with sufficient frequency and coverage to capture acute events. -Typically monthly sampling during key periods. -Lengthy period of record (sampled over a period of months for >2 years)	- Data have moderate precision and sensitivity. - Professional scientist provides training; the individual collecting the samples is well trained. - Qualified professional collects samples; Data is analyzed in a competent laboratory that uses methods with low detection limits -QC documents where there are no sampling or analytical errors. - Moderate replication used for toxicity tests	Data are older than ideal, but there are no indications that conditions have changed significantly.
4	-Combination of three or more of the following: water column chemistry, sediment chemistry, chlorophyll or bioaccumulation data; or toxicity testing. >3 acute and chronic ambient tests; or acute or chronic sediment tests.	Broad spatial (several) and temporal coverage (monthly sampling during key periods for > 3 yrs) of site with sufficient frequency and parameter coverage to capture acute events, chronic conditions and all other potential impacts.	-High precision and sensitivity. -Data collected and analyzed by qualified professionals following detailed QA/QC protocols. -High replication used for toxicity tests	-Data are current,. generally less than 5 years old, and/or there is high certainty that conditions have not changed since data were collected.

Table 3. Habitat/Physical Sufficient Credible Data Decision Table for Aquatic Life Use (Streams)

Score	Technical Components	Spatial/Temporal Coverage	Data Quality	Data Currency
1	-Habitat characteristics were observed visually with no true assessment -Only has documentation of land use practices that might alter habitat. - No attempt to compare to reference condition; observed impacts are likely to be natural.	Sporadic visits; assessments are only made at limited access points such as road crossings.	-Data precision and sensitivity are very low or unknown. - Data were not collected by trained individuals following appropriate protocols.	-Data are not relevant; habitat has likely changed significantly since the assessment was made.
2	- Visual observations of habitat characteristics were made with simple assessment. - Land use maps used to characterize watershed condition; Probable sources of impairment are documented. - Reference Condition can be approximated by a qualified professional.	-Limited to annual visit and non-specific to season; -Limited spatial coverage -Site specific studies	- Data precision and sensitivity are low - Data were collected following appropriate protocols; however individuals had limited training. - Qualified professional involved only through correspondence.	- It is unlikely that the habitat has changed significantly since the assessment was made.
3	- Use of visual-based habitat assessment following SOPs (e.g., Stream Reach Assessment and PFC). - Documentation includes photographs. - Assessment includes quantitative measurements of selected parameters. - Data on land use are used to supplement assessment. - Reference condition can be determined with a reasonable degree of confidence and used as a basis for assessment.	-Assessment normally occurs during a single season. - Assessment is broad; often covering the entire stream reach or region. - An attempt was made to access the stream reach wherever possible.	- Data have moderate precision and sensitivity. - Professional biologist performs survey or provides training; the individual making the assessment is well trained. - Professional biologist or hydrologist performs the assessment.	- Data were collected recently or it is very unlikely that the habitat has changed significantly since the assessment was made.
4	-Assessment of habitat based on quantitative measurements of instream parameters, channel morphology and floodplain characteristics. -Reference condition is well understood and is used as the basis of the assessment.	-Good access of the entire stream reach including private property. - Helicopter surveys, etc. -Data from multiple years.	-High precision and sensitivity. -Assessment was performed by highly experienced professional.	-Data are current; There is no doubt that the assessment reflects current conditions.

Table 4. Biology Sufficient Credible Data Tables for Aquatic Life Use (Lakes and Wetlands)

Score	Technical Components	Spatial/Temporal Coverage	Data Quality	Data Currency
1	- Simple documentation, visual observations only(no true assessment) - Unable to make a comparison to reference condition. - Relative abundance data of fish is not supplemented with quantitative data or can not be interpreted by a qualified professional. - Fish creel surveys with limited supplemental information.	- Very limited monitoring	-Data precision and sensitivity are very low or unknown. - Professional biologist does not provide any oversight. - Poor taxonomic resolution	-Data do not reflect current conditions.
2	- Only one biological assemblage was surveyed or observed (usually fish or algae for lakes; and waterfowl, vegetation or macroinvertebrates for wetlands); includes documentation sufficient for interpretation by qualified professional. - Probable sources and causes of impairment are documented. - Reference condition can be approximated by a qualified professional.	-Limited to a single sampling - Limited sampling for site-specific studies	- Data precision and sensitivity are low to moderate. - Data were collected or observations were made following appropriate protocols, but individuals had limited training. - Professional biologist provided oversight. - Good taxonomic resolution.	- Data are substantially older than ideal, but there is reason to believe that current conditions are reasonably represented.
3	- Relative abundance data or well-documented observations for two biological assemblages such as fish, algae, macroinvertebrates, amphibians, etc., with quantitative (e.g. population, growth rates, primary production, age class, size, condition) data for at least one assemblage. - May include biotic index interpretations. -The entire fish assemblage may not be targeted but all fish species sampled were identified. - Reference condition can be determined with a reasonable degree of confidence and used as a basis for assessment.	-Monitoring normally occurs during a single season. - Monitoring may include site specific studies, but has limited spatial coverage	- Data have moderate precision and sensitivity. - Qualified professional performs survey or provides training; the individual making the survey is well trained. - Qualified professional performs the survey or makes observations. - Detailed taxonomic resolution	Data are older than ideal, but there are no indications that conditions have changed significantly.
4	-Two or more assemblages were surveyed and assessed; includes quantitative measurements for at least two assemblages following detailed SOPs. -Reference condition is well understood and is used as the basis of the assessment. -The fish survey was designed to sample the entire fish assemblage. -Often includes biotic index interpretations	-Surveys conducted for multiple years and/or seasons - Broad coverage of sites - Often uses targeted or probabilistic design	-High precision and sensitivity. -Assessment performed by a highly experienced professional biologist. -Detailed taxonomic resolution	-Data are current, generally less than five years old, and/or there is certainty that the conditions have not changed..

Table 5. Chemistry/Toxicity Sufficient Credible Data Tables for Aquatic Life Use (Lakes and Wetlands)

Score	Technical Components	Spatial/Temporal Coverage	Data Quality	Data Currency
1	-Best professional judgment based on land use data or source locations -Limited chemical analyses which do not provide sufficient information concerning probable causes of impairment. -Data extrapolated when homogeneous conditions are expected	- Low spatial and temporal coverage - limited data at critical periods - Limited period of record (e.g. one day)	-Data precision and sensitivity are very low or unknown and data appear to be an outlier (suspect). - High detection limits make the data difficult to interpret. -QA/QC protocols not followed.	-Data do not reflect current conditions.
2	- Usually grab or composite water quality samples -Screening models based on loading data (not calibrated or verified) - Sediment contamination data (e.g. metal scans) - fish consumption advisories -Chemical parameters limited; however, probable causes of impairment were targeted and documented. - Reference condition can be approximated by a professional. -Acute or Chronic WET; or Acute ambient; or acute sediment tests - Synthesis of historical information on fish contamination levels for lakes - N/P ratios calculated for lakes -Trophic status determined for lakes using at least two of the following; TOC, transparency, primary production, phytoplankton density and/or biomass, total nitrogen, total phosphorus or chlorophyll a.	-Moderate spatial and/or temporal coverage. -Data collected at critical periods (Lakes sampled near turnover, late winter and/or mid-summer; Wetlands sampled in the spring or summer) -Short period of record; but good spatial coverage -Quarterly sampling or targeted seasonal-sampling. - Several parameters often collected over several years (e.g., Secchi Depth).	- Data quality and sensitivity are low to moderate. - Data was collected following appropriate protocols; however individuals had limited training. - Low detection limits -QC indicate there was no contamination or other problems. -low replication used for toxicity tests	- Data are substantially older than ideal, but there is reason to believe that they reasonably indicate current conditions.
3	- Series of grab or composite samples (depth-integrated, diurnal coverage, hypolimnion and epilimnion sampling as appropriate) - Calibrated models - Combination of two or more analyses of the following: water column, sediment, chlorophyll; toxicity testing; primary production; bioaccumulation. -Reference condition can be determined with a reasonable degree of confidence and used as a basis for assessment. -2-3 Acute or Chronic Ambient; or Acute sediment; or Acute and Chronic WET tests for effluent dominated system -trophic status determined using Secchi depth, total phosphorus and chlorophyll a; and includes a dissolved oxygen/temperature profile(s) for lakes. -N/P ratios calculated for lakes	-Broad spatial and temporal coverage of site with sufficient frequency and coverage to capture acute events (lakes sampled near turnover; late winter or mid summer; wetlands sampled late winter/early spring and mid-summer). -Typically monthly sampling during key periods. -Lengthy period of record (sampled over a period of months for >2 years)	- Data have moderate precision and sensitivity. - Qualified professional provides training; the individual collecting the samples is well trained. - Qualified professional collects samples; Data are analyzed in a competent laboratory that uses methods with low detection limits -QC documents that there are no sampling or analytical errors. - Moderate replication used for toxicity tests	Data are older than ideal, but there are no indications that conditions have changed significantly.
4	-Combination of three or more of the following: water column chemistry, sediment chemistry, chlorophyll a, primary production, bioaccumulation data or toxicity testing. - Includes trophic status, dissolved oxygen profiles and N/P ratios (lakes) >3 acute and chronic ambient tests; or acute or chronic sediment tests. - Includes sediment core sampling	Broad spatial (several) and temporal coverage (monthly sampling during key periods for > 3 yrs) of site with sufficient frequency and parameter coverage to capture acute events, chronic conditions and other potential impacts.	-High precision and sensitivity. -Data collected and analyzed by professionals following detailed QA/QC protocols. -high replication used for toxicity tests	-Data are current, generally less than 5 years old, and/or it is essentially certain that conditions have not changed since they were collected.

Table 6. Physical/Habitat Sufficient Credible Data Tables for Aquatic Life Use (Lakes and Wetlands)

Score	Technical Components	Spatial/Temporal Coverage	Data Quality	Data Currency
1	-Habitat characteristics were observed visually with no true assessment - Simple documentation of practices that might alter habitat. - No attempt to compare to reference condition; observations are likely to be natural.	Sporadic visits; assessments only at limited areas.	-Assessment precision and sensitivity are very low or unknown. - Assessment was not conducted by trained individuals.	-Data do not reflect current conditions.
2	- Visual observations of habitat characteristics or impairments (e.g. shoreline erosion, fluctuating water levels, siltation, riparian and aquatic vegetation, grazing, buffer zones, spawning areas, wildlife habitat/use) were made with simple assessment. - Use of land use maps to characterize watershed condition; probable impairment causes & sources documented. - Reference condition can be approximated by a qualified professional.	-Limited to annual visit and non-specific to season; -Limited spatial coverage -Site specific studies	- Assessment precision and sensitivity are low - Assessment was undertaken following appropriate protocols, but individuals had limited training. - Qualified professional involved only through correspondence.	- Data are substantially older than ideal, but there is reason to believe they reasonably indicate current conditions.
3	- Use of visual-based habitat assessment following SOPs; and/or includes a detailed interpretation. - Documentation includes photographs - Sources and causes of impairment are well documented and understood. - Information concerning surrounding land use and/or reservoir management activities is used to supplement assessment. - Reference condition can be determined with a reasonable degree of confidence and used as a basis for assessment.	-Assessment normally occurs during a single season. - Assessment is broad; often covering the entire water body.	- Data have moderate precision and sensitivity. - Qualified professional provides training; the individual making the assessment is well trained. - Qualified professional performs the assessment and makes interpretations.	- Data are older than ideal, but there are no indications that conditions have changed significantly.
4	-- Assessment includes quantitative measurements of selected parameters. -Aerial photographs, satellite images or infrared photographs are used as part of the assessment. Detailed studies conducted to determine impacts to habitat caused by dam operations, etc. -Reference condition is well understood and is used as the basis of the assessment.	-Assessment is broad; often covering the entire water body; data collected from multiple years. -Aerial surveys that are ground truthed.	-High precision and sensitivity. -Assessment was performed by a qualified professional following detailed protocols.	- Data are current, generally less than five years old, and/or it is essentially certain that the conditions have not changed since data were collected.

Appendix B
Basic Standards and Treatment of Water Column

17.30.620 SPECIFIC SURFACE WATER QUALITY STANDARDS--GENERAL (1) Specific surface water quality standards, along with general provisions in ARM 17.30.635 through 17.30.637, 17.30.640, 17.30.641, 17.30.645 and 17.30.646, protect the beneficial water uses set forth in the water-use descriptions for the following classifications of water.

(2) Standards for organisms of the coliform group are based on a minimum of five samples obtained during separate 24-hour periods during any consecutive 30-day period analyzed by the most probable number or equivalent membrane filter methods. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; TRANS, from DHES, 1996 MAR p. 1499.)

17.30.621 A-CLOSED CLASSIFICATION STANDARDS (1) Waters classified A-Closed are to be maintained suitable for drinking, culinary, and food processing purposes after simple disinfection. Water quality is to be maintained suitable for swimming, recreation, growth, and propagation of fishes and associated aquatic life, although access restrictions to protect public health may limit actual use of A-Closed waters for these uses.

(2) Public access and activities such as livestock grazing and timber harvest are to be controlled by the utility owner under conditions prescribed and orders issued by the department.

(3) No person may violate the following specific water quality standards for waters classified A-Closed:

(a) The geometric mean number of organisms in the coliform group must not exceed 50 per 100 milliliters.

(b) No change from naturally occurring dissolved oxygen levels is allowed.

(c) No change from natural pH is allowed.

(d) No increase above naturally occurring turbidity is allowed except as permitted in 75-5-318, MCA.

(e) No increase above naturally occurring water temperature is allowed.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(g) No increase in true color is allowed.

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(h) No increases of carcinogenic, bioconcentrating, toxic or harmful parameters, pesticides and organic and inorganic materials, including heavy metals, above naturally occurring concentrations, are allowed.

(i) No increase in radioactivity above natural background levels is allowed. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

17.30.622 A-1 CLASSIFICATION STANDARDS (1) Waters classified A-1 are to be maintained suitable for drinking, culinary and food processing purposes after conventional treatment for removal of naturally present impurities.

(2) Water quality must be maintained suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(3) No person may violate the following specific water quality standards for waters classified A-1:

(a) The geometric mean number of organisms in the coliform group must not exceed 50 per 100 milliliters if resulting from domestic sewage.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards given in department Circular WQB-7.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) No increase above naturally occurring turbidity or suspended sediment is allowed except as permitted in 75-5-318, MCA.

(e) A 1°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 66°F; within the naturally occurring range of 66°F to 66.5°F, no discharge is allowed which will cause the water temperature to exceed 67°F; and where the naturally occurring water temperature is 66.5°F or greater, the maximum allowable increase in water temperature is 0.5°F. A 2°F-per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55°F A 2°F maximum decrease below naturally occurring water temperature is allowed within the range of 55°F to 32°F.

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(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment except as permitted in 75-5-318, MCA), settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(g) True color must not be increased more than two units above naturally occurring color.

(h) Concentrations of carcinogenic, bioconcentrating, toxic, or harmful parameters which would remain in the water after conventional water treatment may not exceed the applicable standards set forth in department Circular WQB-7.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards contained in department Circular WQB-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) If site-specific criteria are developed using the procedures given in the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, August 1994, and provided that other routes of exposure to toxic parameters by aquatic life are addressed, the criteria so developed shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards in department Circular WQB-7.

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1984 MAR p. 1802, Eff. 12/14/84; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 1999 MAR p. 94, Eff. 1/15/99; AMD, 1999 MAR p. 2257, Eff. 10/8/99; AMD, 1999 MAR p. 2275, Eff. 10/8/99; AMD, 2002 MAR p. 1089, Eff. 2/15/02.)

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17.30.623 B-1 CLASSIFICATION STANDARDS (1) Waters classified B-1 are to be maintained suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(2) No person may violate the following specific water quality standards for waters classified B-1:

(a) During periods when the daily maximum water temperature is greater than 60°F, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters, nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters.

(b) Dissolved oxygen concentration must not be reduced below the levels given in department Circular WQB-7.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) The maximum allowable increase above naturally occurring turbidity is five nephelometric turbidity units except as permitted in 75-5-318, MCA.

(e) A 1°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 66°F; within the naturally occurring range of 66°F to 66.5°F, no discharge is allowed which will cause the water temperature to exceed 67°F; and where the naturally occurring water temperature is 66.5°F or greater, the maximum allowable increase in water temperature is 0.5°F. A 2°F per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55°F. A 2°F maximum decrease below naturally occurring water temperature is allowed within the range of 55°F to 32°F. This applies to all waters in the state classified B-1 except for Prickly Pear Creek from McClellan Creek to the Montana Highway No. 433 crossing where a 2°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 65°F; within the naturally occurring range of 65°F to 66.5°F, no discharge is allowed which will cause the water temperature to exceed 67°F; and where the naturally occurring water temperature is 66.5°F or greater, the maximum allowable increase in water temperature is 0.5°F.

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(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(g) True color must not be increased more than five units above naturally occurring color.

(h) Concentrations of carcinogenic, bioconcentrating, toxic or harmful parameters which would remain in the water after conventional water treatment may not exceed the applicable standards set forth in department Circular WQB-7.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular WQB-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) If site-specific criteria are developed using the procedures given in the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, August 1994, and provided that other routes of exposure to toxic parameters by aquatic life are addressed, the criteria so developed shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards in department Circular WQB-7.

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1982 MAR p. 1746, Eff. 10/1/82; AMD, 1984 MAR p. 1802, Eff. 12/14/84; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 1999 MAR p. 94, Eff. 1/15/99; AMD, 1999 MAR p. 2257, Eff. 10/8/99; AMD, 1999 MAR p. 2275, Eff. 10/8/99; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

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17.30.624 B-2 CLASSIFICATION STANDARDS (1) Waters classified B-2 are to be maintained suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(2) No person may violate the following specific water quality standards for waters classified B-2:

(a) During periods when the daily maximum water temperature is greater than 60°F, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters, nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards given in department Circular WQB-7.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) The maximum allowable increase above naturally occurring turbidity is 10 nephelometric turbidity units except as permitted in 75-5-318, MCA.

(e) A 1°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 66°F; within the naturally occurring range of 66°F to 66.5°F, no discharge is allowed which will cause the water temperature to exceed 67°F; and where the naturally occurring water temperature is 66.5°F or greater, the maximum allowable increase in water temperature is 0.5°F. A 2°F per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55°F. A 2°F maximum decrease below naturally occurring water temperature is allowed within the range of 55°F to 32°F.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), settleable solids, oils, or floating solids which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

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17.30.624 ENVIRONMENTAL QUALITY

(g) True color must not be increased more than five units above naturally occurring color.

(h) Concentrations of carcinogenic, bioconcentrating, toxic or harmful parameters which would remain in the water after conventional water treatment may not exceed the applicable standards set forth in department Circular WQB-7.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular WQB-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) If site-specific criteria are developed using the procedures given in the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, and provided that other routes of exposure to toxic parameters by aquatic life are addressed, the criteria so developed shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards in department Circular WQB-7.

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1982 MAR p. 1746, Eff. 10/1/82; AMD, 1984 MAR p. 1802, Eff. 12/14/84; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 1999 MAR p. 94, Eff. 1/15/99; AMD, 1999 MAR p. 2257, Eff. 10/8/99; AMD, 1999 MAR p. 2275, Eff. 10/8/99; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

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17.30.625 B-3 CLASSIFICATION STANDARDS (1) Waters classified B-3 are to be maintained suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(2) No person may violate the following specific water quality standards for waters classified B-3:

(a) During periods when the daily maximum water temperature is greater than 60°F, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters, nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards specified in department Circular WQB-7.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) The maximum allowable increase above naturally occurring turbidity is 10 nephelometric turbidity units except as permitted in 75-5-318, MCA.

(e) A 3°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 77°F; within the naturally occurring range of 77°F to 79.5°F, no thermal discharge is allowed which will cause the water temperature to exceed 80°F; and where the naturally occurring water temperature is 79.5°F or greater, the maximum allowable increase in water temperature is 0.5°F. A 2°F per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55°F. A 2°F maximum decrease below naturally occurring water temperature is allowed within the range of 55°F to 32°F.

(i) These allowable increases apply to all waters in the state classified B-3, except for the mainstem of the Yellowstone River from the Billings water supply intake to the water diversion at Intake, where a 3°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 79°F; within the range of 79°F to 81.5°F, no thermal discharge is allowed which will cause the water temperature to exceed 82°F; and where the naturally occurring water temperature is 81.5°F or greater, the maximum allowable increase in water temperature is 0.5°F.

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17.30.625 ENVIRONMENTAL QUALITY

(ii) From the water diversion at Intake to the North Dakota state line, a 3°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 82°F; within the range of 82°F to 84.5°F, no thermal discharge is allowed which will cause the water temperature to exceed 85°F; and where the naturally occurring water temperature is 84.5°F or greater, the maximum allowable increase in water temperature is 0.5°F.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(g) True color must not be increased more than five units above naturally occurring color.

(h) Concentrations of carcinogenic, bioconcentrating, toxic, or harmful parameters which would remain in the water after conventional water treatment may not exceed the applicable standards set forth in department Circular WQB-7.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular WQB-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) If site-specific criteria are developed using the procedures given in the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, August 1994, and provided that other routes of exposure to toxic parameters by aquatic life are addressed, the criteria so developed shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards specified in department Circular WQB-7.

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1982 MAR p. 1746, Eff. 10/1/82; AMD, 1984 MAR p. 1802, Eff. 12/14/84; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR

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p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 1999 MAR p. 94, Eff. 1/15/99; AMD, 1999 MAR p. 2257, Eff. 10/8/99; AMD, 1999 MAR p. 2275, Eff. 10/8/99; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

17.30.626 C-1 CLASSIFICATION STANDARDS (1) Waters classified C-1 are to be maintained suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(2) No person may violate the following specific water quality standards for waters classified C-1:

(a) During periods when the daily maximum water temperature is greater than 60°F, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters, nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards given in department Circular WQB-7.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) The maximum allowable increase above naturally occurring turbidity is five nephelometric turbidity units except as permitted in 75-5-318, MCA.

(e) A 1°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 66°F; within the naturally occurring range of 66°F to 66.5°F, no discharge is allowed which will cause the water temperature to exceed 67°F; and where the naturally occurring water temperature is 66.5°F or greater, the maximum allowable increase in water temperature is 0.5°F. A 2°F per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55°F. A 2°F maximum decrease below naturally occurring water temperature is allowed within the range of 55°F to 32°F.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(g) True color must not be increased more than five units above naturally occurring color.

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17.30.626 ENVIRONMENTAL QUALITY

(h) Concentrations of carcinogenic, bioconcentrating, toxic, or harmful parameters may not exceed levels which render the waters harmful, detrimental or injurious to public health. Concentrations of toxic parameters also may not exceed the applicable standards specified in department Circular WQB-7.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular WQB-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) If site-specific criteria are developed using the procedures given in the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, August 1994, and provided that other routes of exposure to toxic parameters by aquatic life are addressed, the criteria so developed shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards in department Circular WQB-7.

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1982 MAR p. 1746, Eff. 10/1/82; AMD, 1984 MAR p. 1802, Eff. 12/14/84; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 1999 MAR p. 94, Eff. 1/15/99; AMD, 1999 MAR p. 2257, Eff. 10/8/99; AMD, 1999 MAR p. 2275, Eff. 10/8/99; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

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17.30.627 C-2 CLASSIFICATION STANDARDS (1) Waters classified C-2 are to be maintained suitable for bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(2) No person may violate the following specific water quality standards for waters classified C-2:

(a) During periods when the daily maximum water temperature is greater than 60°F, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters, nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards given in department Circular WQB-7 These levels apply to all waters in the state classified C-2 except for Ashley Creek below the bridge crossing on airport road where the dissolved oxygen concentrations may not be reduced below 5 mg/l from October 1 through June 1, nor below 3 mg/l from June 2 through September 30.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) The maximum allowable increase above naturally occurring turbidity is 10 nephelometric turbidity units except as permitted in 75-5-318, MCA.

(e) A 1°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 66°F; within the naturally occurring range of 66°F to 66.5°F, no discharge is allowed which will cause the water temperature to exceed 67°F; and where the naturally occurring water temperature is 66.5°F or greater, the maximum allowable increase in water temperature is 0.5°F. A 2°F per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55°F. A 2°F maximum decrease below naturally occurring water temperature is allowed within the range of 55°F to 32°F.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA, settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

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17.30.627 ENVIRONMENTAL QUALITY

(g) True color must not be increased more than five units above naturally occurring color.

(h) Concentrations of carcinogenic, bioconcentrating, toxic, or harmful parameters may not exceed levels which render the waters harmful, detrimental or injurious to public health. Concentrations of toxic parameters also may not exceed the applicable standards specified in department Circular WQB-7.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular WQB-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) If site-specific criteria are developed using the procedures given in the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, August 1994, and provided that other routes of exposure to toxic parameters by aquatic life are addressed, the criteria so developed shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards in department Circular WQB-7.

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1982 MAR p. 1746, Eff. 10/1/82; AMD, 1984 MAR p. 1802, Eff. 12/14/84; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 1999 MAR p. 94, Eff. 1/15/99; AMD, 1999 MAR p. 2257, Eff. 10/8/99; AMD, 1999 MAR p. 2275, Eff. 10/8/99; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

17-2730 3/31/02 ADMINISTRATIVE RULES OF MONTANA

17.30.628 I CLASSIFICATION STANDARDS (1) The goal of the state of Montana is to have these waters fully support the following uses: drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply. An analysis will be performed for each of these waters during each triennial standards review period to determine the factors preventing or limiting attainment of the designated uses listed herein. Based on these analyses, the specific standards listed below will be adjusted to reflect any improvements which have occurred in water quality as a result of water quality control of nonpoint-source pollution.

(2) No person may violate the following specific water quality standards for waters classified I:

(a) During periods when the daily maximum water temperature is greater than 60°F, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters, nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards given in department Circular WQB-7.

(c) Hydrogen ion concentration must be maintained within the range of 6.5 to 9.5.

(d) Except as permitted in 75-5-318, MCA, no increase in naturally occurring turbidity is allowed which will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(e) No increase in naturally occurring temperature is allowed which will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), and settleable solids, oils, or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

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17.30.628 ENVIRONMENTAL QUALITY

(g) No increase in naturally occurring true color is allowed which will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(h) No discharges of toxic, carcinogenic, or harmful parameters may commence or continue which lower, or are likely to lower, the overall water quality of these waters.

(i) As the quality of these waters improves due to control of nonpoint sources, point-source dischargers will be required to improve the quality of their discharges following the MPDES rules (ARM Title 17, chapter 30, subchapter 13).

(j) Beneficial uses are considered supported when the concentrations of toxic, carcinogenic, or harmful parameters in these waters do not exceed the applicable standards specified in department Circular WQB-7 when stream flows equal or exceed the flows specified in ARM 17.30.635(4) or, alternatively, for aquatic life when site-specific criteria are developed using the procedures given in the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, August 1994, and provided that other routes of exposure to toxic parameters by aquatic life are addressed. The limits so developed shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards in department Circular WQB-7.

(k) Limits for toxic, carcinogenic, or harmful parameters in new discharge permits issued pursuant to the MPDES rules (ARM Title 17, chapter 30, subchapter 13) are the larger of either the applicable standards specified in department Circular WQB-7, site-specific standards, or one-half of the mean in-stream concentrations immediately upstream of the discharge point. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1982 MAR p. 1746, Eff. 10/1/82; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 1999 MAR p. 94, Eff. 1/15/99; AMD, 1999 MAR p. 2257, Eff. 10/8/99; AMD, 1999 MAR p. 2275, Eff. 10/8/99; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

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17.30.629 C-3 CLASSIFICATION STANDARDS (1) Waters classified C-3 are to be maintained suitable for bathing, swimming and recreation, and growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers. The quality of these waters is naturally marginal for drinking, culinary and food processing purposes, agriculture and industrial water supply. Degradation which will impact established beneficial uses will not be allowed.

(2) No person may violate the following specific water quality standards for waters classified C-3:

(a) During periods when the daily maximum water temperature is greater than 60°F, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters, nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards specified in department Circular WQB-7.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) The maximum allowable increase above naturally occurring turbidity is 10 nephelometric turbidity units, except as permitted in 75-5-318, MCA.

(e) A 3°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 77°F; within the range of 77°F to 79.5°F, no thermal discharge is allowed which will cause the water temperature to exceed 80°F; and where the naturally occurring water temperature is 79.5°F or greater, the maximum allowable increase in water temperature is 0.5°F. A 2°F per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55°F. A 2°F maximum decrease below naturally occurring water temperature is allowed within the range of 55°F to 32°F.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), settleable solids, oils or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(g) True color must not be increased more than five units above naturally occurring color.

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17.30.629 ENVIRONMENTAL QUALITY

(h) Concentrations of carcinogenic, bioconcentrating, toxic, or harmful parameters which would remain in the water after conventional water treatment may not exceed the applicable standards set forth in department Circular WQB-7.

(i) Dischargers issued permits under ARM Title 17, chapter 30, subchapter 13, shall conform with ARM Title 17, chapter 30, subchapter 7, the nondegradation rules, and may not cause receiving water concentrations to exceed the applicable standards specified in department Circular WQB-7 when stream flows equal or exceed the design flows specified in ARM 17.30.635(4).

(j) If site-specific criteria are developed using the procedures given in the Water Quality Standards Handbook, Second Edition, EPA-823-B-94-005a, August 1994, and provided that other routes of exposure to toxic parameters by aquatic life are addressed, the criteria so developed shall be used as water quality standards for the affected waters and as the basis for permit limits instead of the applicable standards specified in department Circular WQB-7.

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met. (History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1982 MAR p. 1746, Eff. 10/1/82; AMD, 1984 MAR p. 1802, Eff. 12/14/84; AMD, 1988 MAR p. 1191, Eff. 6/10/88; AMD, 1994 MAR p. 2136, Eff. 8/12/94; AMD, 1995 MAR p. 1798, Eff. 9/15/95; AMD, 1996 MAR p. 555, Eff. 2/23/96; TRANS, from DHES, and AMD, 1996 MAR p. 1499, Eff. 6/7/96; AMD, 1999 MAR p. 94, Eff. 1/15/99; AMD, 1999 MAR p. 2257, Eff. 10/8/99; AMD, 1999 MAR p. 2275, Eff. 10/8/99; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

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CIRCULAR WQB-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '--' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.

Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN, NIOSH and SAX Numbers (25) (26) (27)	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17)(3)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Groundwater		
Coliform, fecal §§ -- § --	N/A	Harmful	--	--	--	(13)	Less than 1 per 100ml (6)	1 per 100ml	1 per 100ml
Color §§ -- § --	N/A	Harmful	--	--	--	--	(18)	--	5 UNITS
Copper §§ Cu § Albri Natural Copper § ANAC 110 § Arwood Copper § Bronze Powder § CDA 101 § CDA 102 § CDA 110 § CDA 122 § C.I. 77400 § C.I. Pigment Metal 2 § Copper Bronze § 1721 Gold § Gold Bronze § Kafar Copper § M1 (Copper) § M2 (Copper) § OFHC Cu § Raney Copper	7440508 or 7440-50-8 NIOSH: GL 5325000 SAX: CN1000	Toxic	7.3 @ 50 mg/l) hardness (12) PP	5.2 @ 50 mg/l hardness (12) PP	36	1,300 PP	1,300 PP	0.5	1
Cyanazine §§ Bladex § --	21725-46-2	Toxic	--	--	--	1.0 HA	1.0 HA	N/A	--
Cyanide, total §§ -- § Cyanide § Isocyanide § RCRA Waste Number P030 § Cyanides, includes soluble salts and complexes	57125 or 57-12-5 NIOSH: GS 7175000 SAX: CO1500	Toxic	22 PP	5.2 PP	1	200 MCL	200 MCL	--	5
Dacthal §§ DCPA § --	1861-32-1	Toxic	--	--	--	70 HA	70 HA	0.025	--
Dalapon §§ Revenge § Dalpon § Unipon § Dowpon § Radapon § Basinex § Ded-Weed § Dalacide § Gramevin § Crisapon § Dalpon Sodium § 2,2-Dichloropropionic Acid § SHA 28902, for sodium salt § SHA 28901, for dalapon only Propionic Acid, 2,2-Dichloro- § Sodium 2,2-Dichloropropionate § a-Dichloropropionic Acid § a,a-Dichloropropionic Acid § alpha-alpha-Dichloropropionic Acid	75990 or 75-99-0 NIOSH: UF 0600000 SAX: DG1400	Toxic	--	--	--	200 MCL	200 MCL	1.3	3
Dalapon, sodium salt §§ Dalpon § Unipon § Dowpon § Radapon § Revenge § Basinex § Ded-Weed § Dalacide § Gramevin § Crisapon § Dalpon Sodium § Sodium Dalapon § 2,2-Dichloropropionic Acid § SHA 28902, for sodium salt § SHA 28901, for dalapon only § Propionic Acid, 2,2-Dichloro- § Sodium 2,2-Dichloropropionate § alpha-alpha-Dichloropropionic Acid	127208 or 127-20-8 NIOSH: UF 1225000 SAX: DG1600	Toxic	--	--	--	200 MCL	200 MCL	1.3	3
delta-Hexachlorocyclohexane §§ Lindane § -BHC § delta-BHC § HCH-delta § delta-HCH § -BHC § -Lindane § delta-Lindane § Hexachlorocyclohexane § delta-Benzenehexachloride § Hexachlorocyclohexane-delta § Hexachlorocyclohexane, delta- § Cyclohexane, delta-1,2,3,4,5,6-Hexachloro- § delta-1,2,3,4,5,6-Hexachlorocyclohexane § 1-alpha,2-alpha,3-alpha,4-beta,5-alpha,6-beta-Hexachlorocyclohexane § Cyclohexane, delta-1,2,3,4,5,6-Hexachloro-, (1-alpha, 2-alpha, 3-alpha, 4-beta, 5-alpha, 6-beta)-	319868 or 319-86-8 NIOSH: GV 4550000 SAX: BFW500	Carcinogen	--	--	130	0.14 PP	0.14 PP	N/A	0.1

CIRCULAR WQB-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '--' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.

Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN, NIOSH and SAX Numbers (25) (26) (27)	Category (1) (2)	Aquatic Life Standards (16)		Bioconcentration Factor (BCF) (5)	Human Health Standards (17)(3)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Groundwater		
Lead §§ Pb § C.I. 77575 § C.I. Pigment Metal 4 § Glover § Lead Flake § Lead 22 § Omaha § Omaha & Grant § SI § SO	7439921 or 7439-92-1 NIOSH: OF 7525000 SAX: LCF000	Toxic	82 @ 100 mg/l hardness (12) PP	3.2 @ 100 mg/l hardness (12) PP	49	15 PP	15 PP	0.1	3
m-Xylene §§ -- § m-Xylol § 1,3-Xylene § meta-Xylene § m-Dimethylbenzene § m-Methyltoluene § 1,3-Dimethylbenzene § 1,3-Dimethyl Benzene	108383 or 108-38-3 NIOSH: ZE 2275000 SAX: XHA000	Toxic	--	--	1.17	10,000 MCL	10,000 MCL	0.5	1.5
Malathion §§ -- § Formal § Sumitox § Emmatos § Celthion § Forthion § Malacide § Kop-Thion § Calmathion § Carbethoxy § NCI C00215 § Carbethoxy Malathion § SHA 057701 § Phosphothion § S-1,2-Bis(Ethoxycarbonyl)Ethyl-O,O-Dimethyl Thiophosphate § O, O-Dimethyl-S-(1,2-Dicarbethoxyethyl) Dithiophosphate § O,O-Dimethyl S-1,2-Di(Ethoxycarbamyl)Ethyl Phosphorodithioate § Succinic Acid, mercapto-, diethyl ester, S-Ester with O,O-Dimethyl Phosphorodithioate	121755 or 121-75-5 NIOSH: WM 8400000 SAX: CBP000	Toxic	--	0.1 NPP	--	100 HA	100 HA	--	--
Manganese §§ Mn § Colloidal Manganese § Magnacat § Tronamang	7439965 or 7439-96-5 NIOSH: OO 9275000 SAX: MAP750	Harmful	--	--	--	(24)	(24)	N/A	5
MCPA §§ 4-chloro-2 methylphenoxy acetic acid	94-74-6	Toxic	--	--	--	4 HA	4 HA	N/A	--
MCPP §§ Mecoprop § (+)-2-(4-chloro-2-methylphenoxy)-propanoic acid	7085-19-0	Toxic	--	--	--	7 I	7 I	--	--
Mercury §§ Hg § Colloidal Mercury § Mercury, Metallic § NCI C60399 § Quick Silver § RCRA Waste Number U151	7439976 or 7439-97-6 NIOSH: OV 4550000 SAX: MCW250	Toxic with BCF >300	1.7 PP	0.91 PP	5,500	0.05 PP	2 MCL	N/A	0.6
Metalaxyl § Ridomil § --	57837-19-1	Toxic	--	--	--	420 I	420 I	3.5	--
Methamidophos §§ Monitor § --	10265-92-6	Toxic	--	--	--	0.35 I	0.35 I	--	--
Methomyl §§ Lannate § --	16752-77-5	Toxic	--	--	--	200 HA	200 HA	1	--
Methoxychlor §§ -- § DMDT § Metox § Moxie § Methoxclor § NCI C00497 § Methoxy-DDT § Dimethoxy-DDT § RCRA Waste Number U247 § 1,1,1-Trichloro-2,2-Bis(p-Methoxyphenyl)Ethane § Benzene, 1,1'-(2,2,2-Trichloroethylidene)Bis[4-Methoxy- § 1,1'-(2,2,2-Trichloroethylidene)Bis[4-Methoxybenzene] § Ethane, 1,1,1-Trichloro-2, 2-Bis(p-Methoxyphenyl)-	72435 or 72-43-5 NIOSH: KJ 3675000 SAX: DOB400	Toxic	--	0.03 NPP	--	40 MCL	40 MCL	--	1

Appendix C
Stream and Waterbody Segmentation / Classification

17.30.611 WATER-USE CLASSIFICATION--YELLOWSTONE RIVER DRAINAGE (1) The water-use classifications adopted for the Yellowstone River are as follows:

(a) Yellowstone River drainage to the Laurel water supply intake (approximately at latitude 45.6557, longitude -108.7594) B-1

(b) Yellowstone River drainage from the Laurel water supply intake to the Billings water supply intake (approximately at latitude 45.7745, longitude -108.4778) except the tributaries listed in (1)(b)(i) through (iii) below. B-2

(i) Clarks Fork of the Yellowstone River drainage from source up to and including Jack Creek near Bridger . . B-1

(ii) Mainstem of the Clarks Fork of the Yellowstone River from Jack Creek to the Yellowstone River B-2

(iii) Tributaries to the Clarks Fork Yellowstone River from Jack Creek to the Yellowstone River except the portion of West Fork of Rock Creek listed in (1)(b)(iii)(A) below B-1

(A) West Fork of Rock Creek drainage to the Red Lodge water supply intake (approximately at latitude 45.1593, longitude -109.2779) A-1

(c) Yellowstone River drainage from the Billings water supply intake to the North Dakota state line and including the Big Horn River drainage except the waters listed in (1)(c)(i) through (ix) below C-3

(i) Yellowstone River mainstem B-3

(ii) Pryor Creek drainage to Interstate 90 . . . . . B-1

(iii) Big Horn drainage above but excluding Williams Coulee near Hardin B-1

(iv) Little Big Horn drainage above and including Lodgegrass Creek drainage near Lodge Grass B-1

(v) Little Big Horn River drainage below Lodge Grass Creek B-2

(vi) Big Horn River mainstem from Williams Coulee to Yellowstone River B-2

(vii) Tongue River (mainstem) from the western crossing of the Wyoming boundary and the Tongue River Reservoir to Prairie Dog Creek (approximately at latitude 45.2692, longitude -106.6243) B-2

(viii) Tongue River mainstem from Prairie Dog Creek to Yellowstone River. B-3

(ix) Fox Creek drainage near Sidney B-2

(History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; AMD, 1988 MAR p. 1191, Eff. 6/10/88; TRANS, from DHES, 1996 MAR p. 1499; AMD, 2002 MAR p. 387, Eff. 2/15/02.)

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17.30.612 ENVIRONMENTAL QUALITY

17.30.612 WATER-USE CLASSIFICATIONS--LITTLE MISSOURI RIVER DRAINAGE--BELLE FOURCHE DRAINAGE (1) The water-use classifications adopted for all waters in the Little Missouri and Belle Fourche drainages are C-3
(History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; TRANS, from DHES, 1996 MAR p. 1499.)

17.30.613 WATER-USE CLASSIFICATIONS--HUDSON BAY DRAINAGE The water-use classifications for the Hudson Bay drainage are:

(1) All waters outside Glacier National Park B-1
(History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; TRANS, from DHES, 1996 MAR p. 1499.)

17.30.614 WATER-USE CLASSIFICATIONS--NATIONAL PARK, WILDERNESS AND PRIMITIVE AREA WATERS The water-use classifications for all national park, wilderness and primitive area waters are as follows:

(1) All waters even if classifications listed in ARM 17.30.607 through 17.30.613 imply or state otherwise A-1
(History: 75-5-201, 75-5-301, MCA; IMP, 75-5-301, MCA; Eff. 12/31/72; AMD, Eff. 11/4/73; AMD, Eff. 9/5/74; AMD, 1980 MAR p. 2252, Eff. 8/1/80; TRANS, from DHES, 1996 MAR p. 1499.)

17.30.615 WATER-USE CLASSIFICATIONS AND DESCRIPTIONS - CONSTRUCTED DITCHES, SEASONAL AND SEMI-PERMANENT LAKES AND EPHEMERAL STREAMS (1) The water-use classifications for waters in constructed irrigation ditches and drain ditches that are state waters as defined in 75-5-103, MCA, and the water-use classification for waters in ephemeral streams and seasonal and semi-permanent lakes and ponds are as follows:

(a) waters in constructed irrigation and drain ditches that contain controlled flows of surface water and are de-watered during the non-irrigation season . . . D-1

(b) waters in constructed irrigation and drain ditches that contain controlled flows of surface water mixed with ground water D-2

(c) ephemeral streams including ephemeral streams with flows that are periodically augmented by discharges from point sources E-1

(d) ephemeral streams with flows that are augmented by continuous discharges from point sources . . E-2

(e) seasonal lakes and ponds E-3

(f) semi-permanent lakes and ponds, not including reservoirs, that have an electrical conductivity (EC) less than 7,000 µS/cm E-4

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(g) semi-permanent lakes and ponds, not including reservoirs, that seasonally have an EC equal to or greater than 7,000 µS/cm..... E-5

(h) streams with low or sporadic flow that, because of natural hydro-geomorphic and hydrologic conditions, are not able to support fish..... F-1

(2) This rule does not classify any specific water body. Prior to reclassifying a specific water body classified in ARM 17.30.607 through 17.30.614 under one of the water-use classifications identified in (1)(a) through (h) and before the U.S. environmental protection agency's approval of the water body's revised classification, a use attainability analysis must be conducted in accordance with 40 CFR 131.10(g), (h) and (j). (History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 2002 MAR p. 2196, Eff. 8/16/02; AMD, 2004 MAR p. 725, Eff. 4/9/04.)

17.30.616 WATER-USE CLASSIFICATION AND DESCRIPTIONS FOR PONDS AND RESERVOIRS CONSTRUCTED FOR THE DISPOSAL OF COAL BED METHANE WATER (1) The water-use classification for waters in constructed ponds and reservoirs not located in drainage systems that hold water produced from coal bed methane development and are defined as "state waters" in 75-5-103, MCA, is..... G-1 (History: 75-5-301, MCA; IMP, 75-5-301, MCA; NEW, 2003 MAR p. 1274, Eff. 6/27/03.)

Rules 17.30.617 and 17.30.618 reserved

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Appendix E: Beneficial Use Designation Changes from 2002 to 2004

Planning Area	Major Basin	HUC #	ID Number	Segment Name - Description	2002 Support	UseName	2004 Support
Landusky	Lower Missouri	10040104	MT40E002_050	ALDER GULCH T26N R24E SEC 13 TO T26N R25E SEC 16. Headwaters to Ruby Cr.	P	Aquatic Life Support	N
					P	Warm Water Fishery	N
Landusky	Lower Missouri	10040104	MT40E002_070	RUBY GULCH, Headwaters to 1 Mi Below Zortman, MT T25N R25E SEC 16 TO SEC 7	X	Warm Water Fishery	N
Lower Missouri	Lower Missouri	10060001	MT40S001_011	MISSOURI RIVER from Fort Peck Dam to the Milk R	N	Drinking Water Supply	F
Lower Missouri	Lower Missouri	10060001	MT40S001_012	MISSOURI RIVER from Milk R to the Poplar R	X	Drinking Water Supply	F
Lower Missouri	Lower Missouri	10060005	MT40S003_010	MISSOURI RIVER from the Poplar R to North Dakota	F	Primary Contact (Recr)	X
Ruby	Upper Missouri	10020003	MT41C002_050	RAMSHORN CREEK from headwaters to mouth (Ruby R)	X	Aquatic Life Support	P
					X	Cold Water Fishery - Trout	P
					P	Primary Contact (Recr)	F
Lower Gallatin	Upper Missouri	10020008	MT41H001_010	GALLATIN RIVER from Spanish Cr to the mouth (Missouri R)	N	Aquatic Life Support	P
					N	Drinking Water Supply	F
Lower Gallatin	Upper Missouri	10020008	MT41H002_031	SOUTH COTTONWOOD CREEK, Middle Cr Assoc Ditch diversion to the mouth (Gallatin R)	X	Aquatic Life Support	P
					X	Cold Water Fishery - Trout	P
					X	Drinking Water Supply	F
					X	Agriculture	F
					X	Industrial	F
Lower Smith	Upper Missouri	10030103	MT41J001_020	SMITH RIVER from Hound Cr. to the mouth (Missouri R)	N	Aquatic Life Support	P
Big Springs	Lower Missouri	10040103	MT41S004_020	BIG SPRING CREEK from East Fork to mouth (Judith R)	F	Primary Contact (Recr)	P
Big Springs	Lower Missouri	10040103	MT41S004_030	BEAVER CREEK from headwaters to the mouth (Cottonwood Cr)	P	Drinking Water Supply	F
Big Springs	Lower Missouri	10040103	MT41S004_040	CASINO CREEK, Headwaters to mouth (Big Spring Cr)	X	Drinking Water Supply	F
Big Springs	Lower Missouri	10040103	MT41S004_052	COTTONWOOD CREEK from county road bridge at T14N R18E Sec18 to mouth (Big Spring Cr)	F	Agriculture	P
Paradise	Yellowstone	10070001	MT43B002_010	REESE CREEK from the state border to the mouth (Yellowstone R)	P	Aquatic Life Support	F
					X	Primary Contact (Recr)	F
					X	Drinking Water Supply	F
					X	Agriculture	F
					X	Industrial	F
Paradise	Yellowstone	10070002	MT43B004_120	MOL HERON CREEK, Yellowstone National Park boundary to mouth (Yellowstone R)	F	Cold Water Fishery - Trout	P
Boulder - Big Timber	Yellowstone	10070002	MT43B004_142	EAST BOULDER RIVER from NF boundary to Elk Cr	X	Drinking Water Supply	F

Support Key: F - Fully N-Not Supporting P - Parital T - Threatened X - Not Assessed

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Monitoring & Assessment Design Workbook

Appendix D
Treatment of Sediment
(not available)

Appendix E
Treatment of Biological

MONTANA

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Program Description

The Montana Department of Environmental Quality (DEQ) strongly encourages the use of biological data for making ALUS determinations (more than 90% of MT's 303(d) assessments include biological data). It is very difficult to acquire sufficient credible data in Montana without having biological data; thus the incorporation of bioassessment in DEQ's monitoring program is very important.

DEQ is in the second year of collecting macroinvertebrate and periphyton data from fixed station sites that are located on major streams throughout Montana. The primary objective is to determine status and trends. In 2002, the Department initiated an effort to develop vegetation assessment tools for assessing the biological conditions of riparian areas and wetlands and is also looking at amphibians. In the past, wetland macroinvertebrate and diatom communities have been assessed.

DEQ collaborates with a number of agencies and organizations. The Montana Bureau of Land Management has helped fund DEQ's statewide biological monitoring efforts. USGS is collecting chemistry data at most fixed station sites. The Department is also working closely with the wetlands program, universities and the Montana Natural Heritage Program to assess riparian zones. For 303(d) purposes DEQ has collaborated with conservation districts, the Natural Resource Conservation Service, USFS, and USEPA, among others.

In 2000 DEQ developed a new listing methodology that strongly encourages the use of biological data to assess waters for 303(d) purposes. The Department was required to use this methodology for all waters that were previously listed as impaired, but were unfortunately not required to use the new listing methodology for streams that were previously listed as fully supporting ALU. Montana DEQ is also currently forming workgroups to begin the process of developing a state-wide water quality database that can be accessed by federal and state agencies in Montana.

Some challenges include achieving access to private lands and assessing prairie streams that are located in eastern Montana. In the future DEQ intends to develop and implement a random study design to assess the biological condition of smaller order streams.

Documentation and Further Information

Year 2001 305(b) Report Database and Year 2000 303(d) List Database:
http://nris.state.mt.us/scripts/esrimap.dll?name=TMDL&Cmd=INST

DRAFT 2002 Montana 303(d) List: http://nris.state.mt.us/scripts/esrimap.dll?name=TMDL2002&Cmd=INST

Montana's *Water Quality Standards and Classifications*: http://www.deq.state.mt.us/wqinfo/Standards/Index.asp

Water Quality Monitoring Standard Operating Procedures: http://www.deq.state.mt.us/ppa/mdm/SOP/sop.asp

Montana Natural Heritage Program homepage: http://nhp.nris.state.mt.us/

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MONTANA

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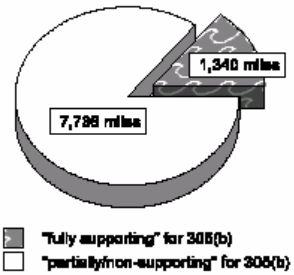
Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
	UD	promulgated into state water quality standards as biocriteria
		support of antidegradation
		evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
		other:
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(special projects only)*
	✓	fixed station (i.e., water quality monitoring stations) *(comprehensive throughout jurisdiction)*
	✓	probabilistic by stream order/catchment area *(special projects only)*
	✓	probabilistic by ecoregion, or statewide *(special projects only)*
		rotating basin
		other:

Stream Miles

Total miles *(determined using RF3)*	**176,750**
Total perennial miles	53,221
Total miles assessed for biology*	**9,076**
fully supporting for 305(b)**	1,340
partially/non-supporting for 305(b)**	7,736
listed for 303(d)	7,736
number of sites sampled *(USGS sites)*	~40
number of miles assessed per site	–

9,076 Miles Assessed for Biology



*MT DEQ collects biological data as part of a joint project with USGS to assess 38 sites that are located near the mouth of major streams and rivers. Aside from this, Montana does not have a state biological monitoring program but it is currently under development.

**71% of the waters that were assessed as fully supporting ALU used biological data; 94% of the waters where ALUS was determined to be impaired used biological data.

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Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Class System (A,B,C), Warm Water vs. Cold Water
ALU designations in state water quality standards	Although there are 9 classifications (A, B, C and subdivided), Class A-Closed is suitable for growth and propagation of fishes and associated aquatic life (among other uses) and Classes A-1, B-1, B-2, B-3, C-1 AND C-2 must have water quality suitable for growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers (among other uses).
Narrative Biocriteria in WQS	under development (Brief biocriteria language without formal numeric translation mechanism located in WQS. Informal numeric procedures located in guidance document for 303(d) listing purposes complying with WQS.)
Numeric Biocriteria in WQS	none

Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
	✓	cause and effect determinations
		permitted discharges
	✓	monitoring (e.g., improvements after mitigation)
	✓	watershed based management
Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	TMDL targets	

Reference Site/Condition Development

Number of reference sites	**~50 total (potential reference sites)***	
Reference site determinations	✓	site-specific
		paired watersheds
	✓	regional (aggregate of sites)
	✓	professional judgment
		other:
Reference site criteria	specific criteria under development; currently using best professional judgment to determine "least impaired" considering geomorphology, habitat, landuse, biology, and chemistry	
Characterization of reference sites within a regional context	✓	historical conditions
	✓	least disturbed sites
		gradient response
	✓	professional judgment
	✓	other: some sites are minimally disturbed**
Stream stratification within regional reference conditions	✓	ecoregions (or some aggregate)
	✓	elevation
	✓	stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
		other:
Additional information	✓	reference sites linked to ALU
		reference sites/condition referenced in water quality standards
	✓	some reference sites represent acceptable human-induced conditions

*In 2001, Montana DEQ began the process of locating reference sites using GIS and sampled ~30 potential reference sites using EMAP methods. A similar effort was made in 1990 when ~38 sites were sampled. In total, Montana has assessed ~50 potential reference sites.

**Montana's regional reference sites are characterized as least disturbed. These sites are used to describe the best potential for a stream given the historical land use. However, many least disturbed reference sites are actually *minimally* disturbed, especially those sites that are located in the Rocky Mountain Ecoregion. In this case the best potential for a stream is near natural condition. These streams are often located in roadless areas, wilderness areas or National Parks.

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Field and Lab Methods

Assemblages assessed	✓	benthos *(100 - 500 samples per year; single season, multiple sites - broad coverage)*
	✓	fish *(<100 samples per year; single season, multiple sites - broad coverage)*
	✓	periphyton *(100 - 500 samples per year; single season, multiple sites - broad coverage)*
	✓	other: macrophytes *(<100 samples per year; single season, multiple sites - watershed level)*
Benthos		
sampling gear		Hess, D-frame, kick net (1m); 500 - 600 and >800 micron mesh sizes
habitat selection		richest habitat, riffle/run (cobble), multihabitat, woody debris
subsample size		300-500 count
taxonomy		combination - lowest feasible
Fish		
sampling gear		backpack and boat electrofishers, seine; 1/4" mesh
habitat selection		multihabitat
sample processing		length measurement, anomalies
subsample		none
taxonomy		species
Periphyton		
sampling gear		**natural substrate**: suction device, brushing/scraping device
habitat selection		riffle/run (cobble), multihabitat
sample processing		chlorophyll *a* / phaeophytin, biomass, taxonomic identification
taxonomy		diatoms (mainly species level), all algae (genus and species)
Habitat assessments		visual based, quantitative measurements, hydrogeomorphology, pebble counts; performed with and independent of bioassessments
Quality assurance program elements		standard operating procedures, quality assurance plan, periodic meetings and training for biologists, sorting and taxonomic proficiency checks, specimen archival

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
	✓	parametric ANOVAs
	✓	multivariate analysis
	✓	biological metrics *(aggregate metrics into an index and return single metrics)*
	✓	disturbance gradients
		other:
Multimetric thresholds		
transforming metrics into unitless scores		cumulative distribution function
defining impairment in a multimetric index		75% of reference condition
Multivariate thresholds		
defining impairment in a multivariate index		significant departure from mean of reference population
Evaluation of performance characteristics	✓	repeat sampling *(duplicates)*
	✓	precision *(splits with USGS and EMAP for bioassessments)*
		sensitivity
	✓	bias *(comparison of different methods)*
		accuracy
Biological data		
Storage		developing use of MS Access and Excel
Retrieval and analysis		Systat, Statmost

Appendix F
Naming Conventions
(not available)

Appendix G
303(d) example

Table 2. Year 2004 303(d) Waterbodies Added to the List of Impaired Streams (i.e. List Categories 4C or 5)

HUC	TPA	ID Number	Segment Name - Description	Size / Units	List Category
10040103	Big Springs	MT41S004_010	BIG SPRING CREEK from East Fork Big Spring Cr to Casino Cr	1.9 Mi	5
10040101	Bullwhacker-Dog	MT41T002_020	DOG CREEK from Cutbank Cr to the mouth (Missouri R)	25.3 Mi	4C
10040101	Bullwhacker-Dog	MT41T002_030	EAGLE CREEK from Dog Cr to the mouth (Missouri R)	18 Mi	4C
10070006	Clarks Fork Yellowstone	MT43D001_011	CLARKS FORK YELLOWSTONE RIVER, Bridger Cr to mouth (Yellowstone R)	41.3 Mi	5
10040103	Judith - Arrow	MT41S002_100	LAST CHANCE CREEK headwaters to mouth (Moccasin Cr)	5.4 Mi	5
10050009	Landusky	MT40I001_050	LODGE POLE CREEK headwaters to Fort Belknap Reservation boundary	4.2 Mi	5
10070002	Paradise	MT43B004_062	TOM MINER CREEK from0.3 mi below Skully Cr to Tepee Cr.	6.7 Mi	4C
17010213	Prospect Creek	MT76N003_021	ANTIMONY CREEK DRAINAGE headwaters to mouth (Prospect Creek)	2 Mi	5
17010213	Prospect Creek	MT76N003_022	COX GULCH headwaters to mouth (Prospect Cr)	3 Mi	5
10020003	Ruby	MT41C002_090	CALIFORNIA CREEK tributary of Ruby R T-5S R-4W	10.9 Mi	5
10020003	Ruby	MT41C002_100	GARDEN CREEK, Headwaters to mouth at Ruby Reservoir	7.3 Mi	5
10020003	Ruby	MT41C003_020	COAL CREEK from headwaters to mouth (Middle Fork Ruby R)	8.3 Mi	5
17010213	Thompson	MT76N005_010	FISHTRAP CREEK from headwaters to the mouth (Thompson R)	19.8 Mi	4C

Appendix H
Assessment Protocols for Listing and Delisting

Montana's Assessment Process

Montana water quality law requires that the listing of waters as impaired or threatened must be supported by "sufficient credible data" to ensure that such listings are justified. This sufficient credible data threshold applies both to the reassessment of waters listed on previously published lists and to the consideration of any additional waters for listing.

DEQ uses a two-step process to assess waters in compliance with the requirements of state law. First, DEQ searches out the available data for a waterbody and evaluates whether there are sufficient credible data to make a valid and reliable determination of beneficial use support. Then, if the data are adequate, DEQ compares the data with the applicable water quality standards to make a beneficial use-support determination. The following paragraphs provide an overview of this process. Readers wanting a detailed explanation of the process, along with the tables and criteria used in making the sufficient credible data assessments and beneficial use determinations, will find these in Appendix A.

Identification of Available Water Quality Data

In recent years, DEQ's water quality monitoring data along with information from other selected sources have been incorporated into computerized water quality databases. These records and databases provided a foundation, which is updated as new monitoring data is collected by DEQ or obtained from others sources. Then, at the beginning of each reassessment cycle, DEQ sends out requests for information to several hundred individuals, organizations, and agencies involved in water quality monitoring and management. Responses to these requests provide much useful information as well as references to additional materials available from other sources. The data and information obtained from outside sources are combined with the results derived from DEQ's ongoing monitoring efforts to provide the basis for water quality assessments.

Sufficient Credible Data (SCD) Assessment

Montana law defines sufficient credible data (SCD) as "*chemical, physical, or biological monitoring data, alone or in combination with narrative information, that supports a finding as to whether a water body is achieving compliance with applicable water quality standards*" (75-5-103 MCA). This definition is consistent with a model developed by EPA for assessing the beneficial uses of streams based on a combination of physical (habitat), biological, and chemical monitoring. For example, EPA recommends that monitoring for aquatic life use support include the collection of habitat and community-level biological data as well as the measurement of chemical parameters in water and sediment.

Montana DEQ drew on the EPA model to develop sufficient credible data criteria and decision tables to evaluate data adequacy for streams, lakes, and wetlands. Methods and criteria are specified to evaluate SCD for the Montana Water-Use Classification System beneficial uses. These uses are:

1) drinking, culinary use, and food processing;
2) aquatic life support for fishes, associated aquatic life, waterfowl, and furbearers;
3) bathing, swimming, and recreation;
4) agriculture supply; and,
5) industrial supply.

The sufficient credible data review focuses on four components that contribute to data validity and reliability for water quality assessment:

- Technical soundness of methodology
- Spatial/temporal coverage
- Data quality
- Data currency.

In most cases a finding that there is sufficient credible data will result when several types of data have been collected over a period of time using sound technical methods and there are no indications of recent changes to the water body that would invalidate previously obtained results.

Aquatic Life and Fisheries Support SCD – The Montana Water-Use Classification System requires that all waters support the "*growth and propagation of fishes and associated aquatic life, waterfowl, and furbearers*" (ARM 17.30.604-624). Based on this requirement, the "aquatic life" assessment considers fish, invertebrates, aquatic plants, and associated wildlife. Therefore, the aquatic life sufficient credible data assessment entails an evaluation and scoring of the following data categories:

Habitat/physical – includes qualitative and/or quantitative riparian and aquatic vegetation information, and hydrogeomorphic characteristics and functions.

Biology – includes chlorophyll *a* data; and aquatic biological community data such as fish, macroinvertebrates and algae; and wildlife community characteristics.

Chemistry/toxicity – includes bioassay, temperature and total suspended sediment data and chemistry data such as toxicants, nutrients, and dissolved oxygen. Ideally, SCD for aquatic life would include data pertaining to all three categories; but very strong evidence relating to two data categories can constitute SCD for an aquatic life and fisheries beneficial use-support determination.

Drinking Water and Contact Recreation SCD – For drinking water and contact recreation uses, evaluation of multiple data categories is not necessary. Data are simply rated as sufficient or insufficient for these uses based on tables that apply the four general components of data adequacy to the specific standards underlying drinking water and contact recreation use support.

Agricultural and Industrial Water Supply SCD – Generally, if there are sufficient credible data for drinking water, contact recreation, and aquatic life beneficial use-support determinations, there are also sufficient data to make agriculture and industry beneficial use-support determinations. However, additional salinity and toxicity information may be required for agriculture supply use support determinations.

Beneficial Use-support Determination (BUD)

Once it is ascertained that sufficient credible data are available for a waterbody, the assessment process moves to determine the level of beneficial use support. The degree of support for each beneficial use is rated using four categories:

- Full support
- Partial support

- Non-support
- Threatened

A use is fully supported when all water quality standards applicable to that use are met. When one or more standards are not met due to human activities, the water body is either "not supporting" or "partially supporting" the beneficial use tied to that standard. A use that is currently fully supported but for which observed trends or proposed new sources of pollution indicate a high probability of future impairment may be rated as "threatened." Because the standards for determining use support are different for each use, the use-support determinations for the various uses of a waterbody are often not the same. Only those beneficial uses that apply to the particular water-use classification of a waterbody are evaluated for that waterbody.

Beneficial Use Determination: Aquatic Life and Fisheries – Making aquatic life and fisheries use-support determinations can be a complex process because of the amount and variety of information that may bear on the decision. In some cases the reviewer will evaluate, compare, and weigh many bits of physical, biological, chemical, and habitat data in reaching the aquatic life and fisheries use-support determinations for a waterbody. In other cases clear evidence of use support or impairment or is provided from only one or two of the aquatic life data categories (habitat/physical, biology, and chemistry). Where no single data element by itself supports a conclusion, the assessor follows a process that leads to a determination based on the overall weight of evidence. A slightly different process is followed when data are not available for all the categories, yet there is clear evidence to support a particular determination. Whatever the process used, data showing that aquatic life and fisheries uses are “moderately impaired” result in a “partially supporting” determination. Data indicating that aquatic life and fisheries uses are “severely impaired” result in the waterbody being listed as “not supporting” these uses.

Beneficial Use Determination: Other Uses – Beneficial use determinations for the drinking water, contact recreation, agriculture supply, and industrial supply uses are relatively straightforward. Available data for a waterbody are evaluated using the criteria derived from water quality standards to make a use-support determination. Some determinations will result from clear evidence of support or impairment associated with one or two criteria; others may be derived from indications of water quality derived from the entire set of applicable criteria.

Assessment Determination Categorization – Upon completion of the SCD/BUD assessments for a waterbody, the use support determinations for that water are reviewed and the water is assigned to one of the five assessment categories described previously on Page 2.

Quality Assurance Review

For the 2004 Reporting cycle, systematic review of water quality assessments was initiated and documented. This review covered both administrative and technical components of water quality assessments employing three steps.

• Staff responsible for performing the assessment (assessors) initiated the first stage of quality control by using a checklist to review their own work and ensure that they had properly documented their assessment determinations on the Assessment Record Sheets.
This checklist was prepared for 100 % of assessments/reassessments performed.

• Detailed technical review was performed randomly on 10% of the assessments by management and senior technical staff. This review was recorded on a Technical Review Checklist.

• A final technical and documentation review was carried out during the entry of the assessment determinations into the actual Water Quality Assessment database. This review evaluated both the technical validity and the documentation adequacy of all assessments before keying them into the system.

Assessment Documentation

The full record of DEQ's water quality assessments consists of three parts:

1) The Water Quality Assessment Determinations section of this report, as it appears on the "EnviroNet" Internet site http://nris.state.mt.us/wis/environet/, is Montana's "official" report of state water quality status. Because it would require at least several hundred pages to print out the information provided on the web site, any hardcopy version of this report reflects at least some condensation and abridgement of the version posted on the EnviroNet website.

2) Hardcopy data files for each waterbody segment evaluated during the "sufficient credible data/beneficial use determination" assessment. These files may contain water quality data, maps, photographs, references to relevant documents, and references to electronic information sources. They may be reviewed at the office of the DEQ, Water Quality Planning Bureau.

3) Sufficient Credible Data/Beneficial Use Determination Assessment Record Sheets for each waterbody segment. The assessment of each waterbody is documented on an Excel spreadsheet. These spreadsheets display the data sources used in the assessment, the factors considered, and how those factors were used to reach the determinations. A hard copy of the record sheet for each waterbody segment is included in the segment files described above.

Electronic copies of these record sheets also are linked to the EnviroNet interactive database "full report" pages.

Monitoring, Assessment, and Reassessment of State Waters: 2000 - 2004

When DEQ first applied the "sufficient credible data" methodology to develop the 2000 303(d) List, it found that sufficient data were not available to make use support determinations for approximately 500 waters, which had appeared on previous 303(d) Lists. In accordance with the requirements of the 1997 amendments, these waters were placed on a list of waters to be reassessed as soon as practicable. Appendix B of this report provides, in it's entirety, the original year 2000 "Waters to be Monitored and Reassessed" (Table 3-E, 2000 303(d) List). The table in Appendix B also provides the year in which the waterbody has been reassessed, allowing the public to track the fate of each waterbody segment.

The Department staff conducted monitoring and/or a use-support assessment on 86 waterbody segments from the 2000 "Reassessment List" prior to the publication of the year 2002 303(d) List. Of these 86 waterbodies, 55 segments were determined impaired and added to the 2002 303(d) List and 12 segments were determined as fully supporting all beneficial uses. The remaining 19 waterbody segments remained on the Reassessment List in 2002 with about one third of these waters being portions split off of larger segments because monitoring data revealed that the original segment was not a homogeneous unit.

Since publication of the 2002 303(d) List, the Department has conducted monitoring and/or a use support assessment on another 115 waterbody segments (Appendix C) where 28 of these waterbodies were from the Reassessment List. Of these, 12 have been determined to be impaired for one or more uses, while 16 determined as fully supporting all beneficial uses assessed
In all, 24 of the 115 waterbody segments assessed for the 2004 Integrated Report were found to be fully supporting (i.e. Category 1) all beneficial uses (Table 1). A total of 13 new waterbody segments were added to the list of impaired waters (i.e. Categories 4 or 5) (Table 2). The assessments also resulted in some changes to listed probable causes of impairments on 43 segments (Appendix D), and modification to use support designations on 23 waterbody segments (Appendix E). The remaining 388 waterbody segments on the original Reassessment List will be monitored and/or assessed by DEQ prior to the 2006 Integrated Report submission. The list of waters scheduled for monitoring and/or assessment appears in Appendix F.

A complete listing of all impaired waters in categories 4A, 4C, and 5 is provided in the Sub-Basin Reports Section of this document. A report from the Assessment Database was run for each of Montana's 4th code USGS HUCs, or sub-basins, and includes a sub-basin map, a listing of each waterbody segment, its use support designations, causes and sources of impairments, and the list category.

XX) Appendices Map

Main Website - http://www.deq.state.mt.us/wqinfo/

- Administrative Rules - http://www.deq.state.mt.us/dir/legal/Chapters/CH30-06.pdf
- Numeric Water Quality Standards (Circular WQB-7) – http://www.deq.state.mt.us/wqinfo/Circulars/WQB-7.PDF
- 303(d)/305(b) Home - http://www.deq.state.mt.us/wqinfo/303_d/303d_information.asp
- 2004 Integrated Report (303(d) & 305(b)) - http://nris.state.mt.us/wis/TMDLApp/pdf2004/OverviewText.pdf

Appendix A – Found in the Water Quality Assessment Process and Methods at http://www.nris.state.mt.us/wis/TMDLApp/pdf2002/Appendix_A.pdf
- See page 19 through 25.

Appendix B – Found in the Montana Numeric Water Quality Standards and the Administrative Rules of Montana, respectively at
http://www.deq.state.mt.us/wqinfo/Circulars/WQB-7.PDF
- Examples from pages 12 and 22.
http://www.deq.state.mt.us/dir/legal/Chapters/CH30-06.pdf
- See pages 17-2711 through 17-2736

Appendix C – Found in the Administrative Rules of Montana and the 2004 Integrated Report, Appendix E; respectively at
http://www.deq.state.mt.us/dir/legal/Chapters/CH30-06.pdf
- See pages 16 and 17.
http://nris.state.mt.us/wis/tmdlapp/pdf2004/Appendix_E.pdf
- See page E-1

Appendix D – not available

Appendix E – Found on a PDF created by the EPA entitled "Summary of Bioassessment Programs and Biocriteria Development" – Dec. 2002.
http://www.epa.gov/bioindicators/pdf/MT_summary_final.pdf

Appendix F – not available

Appendix G – Found in the 2004 Integrated Report Overview -
http://nris.state.mt.us/wis/TMDLApp/pdf2004/OverviewText.pdf
- See page 8

Appendix H – Found in the 2004 Integrated Report Overview -
http://nris.state.mt.us/wis/TMDLApp/pdf2004/OverviewText.pdf
- See pages 2-7

The Clean Water Act: NEW MEXICO

I) WQCC and State Review Process

The basic authority for water quality management in New Mexico is provided through the State Water Quality Act (§§ 74-6-1 *et seq.*, NMSA 1978). This law establishes the Water Quality Control Commission (WQCC, commission) and specifies its duties and powers. *The commission is the state water pollution control agency for this state for all purposes of the federal* [Clean Water] *act.* The duties and powers of the commission include adoption of a comprehensive water quality management program, the development of a continuing planning process, the administration of loans and grants from the federal government, the adoption of water quality standards, and the adoption of regulations "*to prevent or abate water pollution in the state or in any specific geographic area or watershed of the state...or for any class of waters*." Under this Act, water is defined as *all water, including water situated wholly or partly within or bordering upon the state, whether surface or subsurface, public or private, except private waters that do not combine with other surface or subsurface water* [§ 74-6-2.G, NMSA 1978].

The New Mexico Water Quality Control Commission consists of twelve members representing 8 "constituent agencies" (see 1 - 8 below) and 4 appointed members (see 9 & 10 below) [§ 74-6-3.A, NMSA 1978, 2001 Supplement]:

1) the Secretary of Environment Department, or a designated staff member;

2) the director of the Department of Game & Fish, or a designated staff member;

3) the State Engineer, or a designated staff member;

4) the chairman of the Oil Conservation Commission, or a designated staff member;

5) the director of the State Parks Division, or a designated staff member;

6) the director of the New Mexico Department of Agriculture, or a designated staff member;

7) the chairman of the Soil and Water Conservation Commission, or a designated staff member;

8) the director of the Bureau of Geology and Mineral Resources, or a designated staff member;

9) one representative from municipal or county government; and

10) three representatives of the public to be appointed by the Governor for a term of four years.

The **Water Quality Management Plan** is the formal document adopted by the New Mexico Water Quality Control Commission that delineates a detailed program for approaching New Mexico's unique and complex surface water quality issues. The most

recent update of this plan was approved by the WQCC on Tuesday, May 13, 2003. The plan update is currently under final review by the Region VI Offices of the US Environmental Protection Agency.

This plan is available at http://www.nmenv.state.nm.us/swqb/Planning/Water_Quality_Management_Plan/WQMP_05_13_03.pdf

The Commission usually meets in public on the second Tuesday of the month. The WQCC may not meet during the legislative session or if there are no agenda items to discuss. Meetings are usually in the City of Santa Fe or as indicated on the meeting notice. The meeting notice and meeting minutes are available on the internet at http://www.nmenv.state.nm.us/Oots/wqcc.htm#Meeting_Notice.

All questions regarding the Commission should be directed to:

Geraldine Madrid-Chavez, Commission Administrator
NMED Boards and Commissions
1190 St. Francis Drive, N2054
Santa Fe, New Mexico 87502
Tel (505) 827-2425
Fax (505) 827-2836
Geraldine_Chavez@nmenv.state.nm.us

The Commission held its last meet in public on **October 14, 2003** in Santa Fe.

Triennial Review:

REVIEW OF STANDARDS; NEED FOR ADDITIONAL STUDIES:

A. Section 303(c)(1) of the federal Clean Water Act requires that the state hold public hearings at least once every three years for the purpose of reviewing water quality standards and proposing, as appropriate, necessary revisions to water quality standards.

B. It is recognized that, in some cases, numeric standards have been adopted which reflect use designations rather than existing conditions of surface waters of the state. Narrative standards are required for many constituents because accurate data on background levels are lacking. More intensive water quality monitoring may identify surface waters of the state where existing quality is considerably better than the established standards. When justified by sufficient data and information, the water quality standards will be modified to protect the designated uses which are attainable.

C. It is also recognized that contributions of water contaminants by diffuse nonpoint sources of water pollution may make attainment of certain standards difficult. Revision of these standards may be required as new information is obtained on nonpoint sources and other problems unique to semi-arid regions.
[20.6.4.9 NMAC – Rp 20 NMAC 6.1.1102, 10-12-00]

New Mexico's current Water Quality Standards define the goals for a waterbody by designating its uses, setting criteria to protect those uses, and establishing provisions to protect water quality from pollution. The triennial review process for examining current State Standards is in obligation to § 303(c) of the federal Clean Water Act.
The US EPA provides approval, policy and guidance for New Mexico's Water Quality Standards. USEPA will review New Mexico's final Water Quality Standards at the conclusion of the triennial review process.

Starting in 1998 the SWQB had a goal of monitoring all watersheds in the state on a 5-year cycle.

Monitoring consists of three-season physical/chemical sampling and biological monitoring. The SWQB coordinates with New Mexico Department of Game and Fish to obtain the most current fishery assessments in these watersheds.

The benefits of this approach ~

- It provides a systematic, detailed review of water quality data and allows for a more efficient use of valuable monitoring resources;
- It provides information at a scale where implementation of corrective activities is feasible;
- With an established order of rotation and predictable sampling in each basin, it is easier to coordinate efforts with other programs and water quality entities, and program efficiency is enhanced and the basis for management decisions is improved.

Five-Year Monitoring Schedule

1998	- Jemez, Chama (Above El Vado), Cimarron, Santa Fe, and San Francisco Rivers
1999	- Lower Chama, Red River Watershed, Middle Rio Grande, Gila River watershed, and Santa Fe River
2000	- Gila River Watershed, Mimbres Basin, Dry Cimarron Basin, upper Rio Grande (1), Shumway Arroyo (San Juan Watershed)
2001	- Upper Rio Grande (2), the upper Pecos River (Ft. Sumner to headwaters), and the Valles Caldera.
2002	- Lower Pecos (Roswell south), Canadian Basin, Lower Rio Grande, San Juan River Basin, Rio Puerco Watershed, Closed Basins, and the Zuni Watershed

The upper Rio Grande 2001 sampling schedule has been decided upon. The dates tentatively are:

Spring	Summer	Autumn
May 22 - 23 - 24	August 21 - 22	October 2 - 3 – 4

The upper Pecos study has been divided into three sections for logistical purposes. Section 1 is from the headwaters to Villanueva; Section 2 is the Gallinas subwatershed (Las Vegas area); Section 3 is the remainder of the watershed down to the Sumner Reservoir delta.

Section 1: May 15 - 17 Section 2, 3: May 29 - 31	Sections 1, 3: July 17 - 18 Section 2: July 24 - 25	Sections 1, 3: October 9 – 11 Section 2: October 16 – 18

The Valles Caldera study will be conducted with the cooperation of the Valles Caldera National Trust Board of Directors. Tentative dates are:

June 4 - 8	August 6 - 10	September 24 - 28

All dates are subject to change pending a study design review by our statistician as well as other logistical considerations. There exists the possibility that we will need more data points, thus more sampling days.

II) Contacts

Water Quality Standards
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NPDES
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TMDLs
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Biological Monitoring
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1190 Saint Francis Drive # Santa Fe, NM 87502-0110
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email: seva_joseph@nmenv.state.nm.us
NMED Surface Water Quality Bureau:
http://www.nmenv.state.nm.us/swqb/swqb.html

To get on an agency's mailing list for:

Proposed Water Quality Rule Changes
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NPDES Permits
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Triennial Review Hearings
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Geraldine_Chavez@nmenv.state.nm.us

(For information on Triennial Review hearings and changes dealing with standards, beneficial uses, classification and antidegradation policy)

III) List of Designated Uses

Coldwater fishery, domestic water supply, fish culture, high quality coldwater fishery, irrigation, irrigation storage, limited warmwater fishery, livestock watering, marginal coldwater fishery, municipal and industrial water storage, municipal and industrial water supply, primary contact, secondary contact, warmwater fishery, wildlife habitat.

For criteria for determination of designated use attainment see Appendix A.

IV) Water Quality Classified Uses and Antidegradation Policy

For New Mexico's Antidegradation Policy see the document entitled "Antidegradation Policies by State."

V) Basic Standards / Criteria

Definitions

"acute toxicity" means toxicity involving a stimulus severe enough to induce a response in 96 hours of exposure or less. Acute toxicity is not always measured in terms of lethality, but may include other toxic effects that occur within a short time period.

"chronic toxicity" means toxicity involving a stimulus that lingers or continues

for a relatively long period relative to the life span of an organism. Chronic effects include, but are not limited to, lethality, growth impairment, behavioral modifications, disease and reduced reproduction.

20.6.4.12 GENERAL STANDARDS: General standards are established to sustain and protect existing or attainable uses of surface waters of the state. These general standards apply to all surface waters of the state at all times, unless a specified standard is provided elsewhere in this part. Surface waters of the state shall be free of any water contaminant in such quantity and of such duration as may with reasonable probability injure human health, animal or plant life or property, or unreasonably interfere with the public welfare or the use of property. When changes in dissolved oxygen, temperature, dissolved solids, sediment or turbidity in a water of the state is attributable to natural causes or the reasonable operation of irrigation and flood control facilities that are not subject to federal or state water pollution control permitting, numerical standards for temperature, dissolved solids content, dissolved oxygen, sediment or turbidity adopted under the Water Quality Act do not apply. The foregoing provision does not include major reconstruction of storage dams or diversion dams except for emergency actions necessary to protect health and safety of the public, or discharges from municipal separate storm sewers.

A. **Bottom Deposits**: Surface waters of the state shall be free of water contaminants from other than natural causes that will settle and damage or impair the normal growth, function, or reproduction of aquatic life or significantly alter the physical or chemical properties of the bottom.

B. **Floating Solids, Oil and Grease**: Surface waters of the state shall be free of oils, scum, grease and other floating materials resulting from other than natural causes that would cause the formation of a visible sheen or visible deposits on the bottom or shoreline, or would damage or impair the normal growth, function or reproduction of human, animal, plant or aquatic life.

C. **Color**: Color-producing materials resulting from other than natural causes shall

not create an aesthetically undesirable condition nor shall color impair the use of the water by desirable aquatic life presently common in surface waters of the state.

D. **Odor and Taste of Fish**: Water contaminants from other than natural causes shall be limited to concentrations that will not impart unpalatable flavor to fish, or result in offensive odor arising in a surface water of the state or otherwise interfere with the reasonable use of the water.

E. **Plant Nutrients**: Plant nutrients from other than natural causes shall not be present in concentrations which will produce undesirable aquatic life or result in a

dominance of nuisance species in surface waters of the state.

F. Toxic Pollutants:

(1) Surface waters of the state shall be free of toxic pollutants from other than natural causes in amounts, concentrations or combinations which affect the propagation of fish or which are toxic to humans, livestock or other animals, fish or other aquatic organisms; wildlife using aquatic environments for habitation or aquatic organisms for food; or which will or can reasonably be expected to bioaccumulate in tissues of fish, shellfish and other aquatic organisms to levels which will impair the health of aquatic organisms or wildlife or result in unacceptable tastes, odors or health risks to human consumers of aquatic organisms.

(2) Pursuant to this section, the human health criteria shall be as set out in 20.6.4.900 NMAC. For a toxic pollutant for human health not listed in 20.6.4.900 NMAC, the following provisions shall be applied in accordance with 20.6.4.10, 20.6.4.11 and 20.6.4.13 NMAC.

(a) The human health criterion shall be the recommended human health criterion for "consumption of organisms only" published by the U.S. environmental protection agency pursuant to Section 304(a) of the federal Clean Water Act. In determining such criterion for a cancer-causing toxic pollutant, a cancer risk of 10-5 (one cancer per 100,000 exposed persons) shall be used.

(b) When a numeric criterion for the protection of human health has not been published by the U.S. environmental protection agency, a quantifiable criterion may be derived from data available in the U.S. environmental protection agency's Integrated Risk Information System (IRIS).

(3) Pursuant to this section, the chronic aquatic life standard shall be as set out in 20.6.4.900 NMAC. For a toxic pollutant for aquatic life with no chronic standard listed in 20.6.4.900 NMAC, the following provisions shall be applied in sequential order in accordance with 20.6.4.10, 20.6.4.11 and 20.6.4.13 NMAC.

(a) The chronic aquatic life criterion shall be the "freshwater criterion continuous concentration" published by the U.S. environmental protection agency pursuant to Section 304(a) of the federal Clean Water Act;

(b) If the U.S. environmental protection agency has not published a chronic aquatic life criterion, a geometric mean LC-50 value shall be calculated for the particular species, genus or group, which is representative of the form of life to be preserved, using the results of toxicological studies published in scientific journals.

(i) The chronic aquatic life criterion for a toxic pollutant which does not bioaccumulate shall be 10 percent of the calculated geometric mean LC-50 value; and

(ii) The chronic aquatic life criterion for a toxic pollutant which does bioaccumulate shall be: the calculated geometric mean LC-50 adjusted by a bioaccumulation factor for the particular species, genus or group representative of the form of life to be preserved, but when such bioaccumulation factor has not been published, the criterion shall be one percent of the calculated geometric mean LC-50 value.

(4) Pursuant to this section, the acute aquatic life criteria shall be as set out in 20.6.4.900 NMAC. For a toxic pollutant for aquatic life with no acute criterion listed in 20.6.4.900 NMAC, the acute aquatic life criterion shall be the "freshwater criterion maximum concentration" published by the U.S. environmental protection agency pursuant to Section 304(a) of the federal Clean Water Act.

(5) Within 90 days of the issuance of a final NPDES permit containing a numeric criterion selected or calculated pursuant to Paragraph 2,

Paragraph 3 or Paragraph 4 of Subsection F of this section, the Department shall petition the Commission to adopt such criterion into these standards.

(6) The use of a piscicide registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. Section 136 et seq., and under the New Mexico Pesticide Control Act (NMPCA), Section 76-4-1 et seq. NMSA 1978 (1973), shall not be a violation of Subsection F of this section when such use has been approved by the commission. Any person seeking commission approval of the use of a piscicide shall file a written petition with the commission. The petition shall contain, at a minimum, the following information: (1) petitioner's name and address; (2) identity of the piscicide; (3) documentation of registration under FIFRA and NMPCA; (4) target and potential non-target species, including threatened or endangered species; (5) potential environmental consequences and protocols for limiting such impacts; (6) affected surface water of the state; (7) results of pre-treatment survey; (8) evaluation of available alternatives and justification for selecting piscicide use; (9) post-treatment assessment monitoring protocol; and (10) any other information required by the commission. The commission shall review the petition and require a public hearing in the locality affected by the proposed use in accordance with Adjudicatory Procedures, 20.1.3 NMAC. In addition to the public notice requirements in Adjudicatory Procedures, 20.1.3 NMAC, the petitioner shall provide written notice to (1) local political subdivisions; (2) local water planning entities; (3) local conservancy and irrigation districts; and (4) local media outlets, except that the petitioner shall only be required to publish notice in a newspaper of circulation in the locality affected by the proposed use. After a public hearing, the commission may grant the petition in whole or in part, may grant the petition subject to conditions, or may deny the petition. In granting any petition in whole or part or subject to conditions, the commission shall require the petitioner to implement post-treatment assessment monitoring.

G. **Radioactivity**: The radioactivity of surface waters of the state shall be maintained at the lowest practical level and shall in no case exceed the standards set forth in the New Mexico Radiation Protection Regulations, 20.3.1.400 through 20.3.1.499 NMAC (5-3-95).

H. **Pathogens**: Surface waters of the state shall be virtually free of pathogens. In particular, surface waters of the state used for irrigation of table crops such as lettuce shall be virtually free of Salmonella and Shigella species.

I. **Temperature**: Maximum temperatures for each classified water of the state have been specified in 20.6.4.101 through 20.6.4.899 NMAC. However, the introduction of heat by other than natural causes shall not increase the temperature, as measured from above the point of introduction, by more than 2.7°C (5°F) in a stream, or more than 1.7°C (3°F) in a lake or reservoir. In no case will the introduction of heat be permitted when the maximum temperature specified for the reach (generally 20°C (68°F) for coldwater fisheries and 32.2°C (90°F) for warmwater fisheries) would thereby be exceeded. These temperature standards shall not apply to impoundments constructed offstream for the purpose of heat disposal. High water temperatures caused by unusually high ambient air temperatures are not violations of these standards.

J. **Turbidity**: Turbidity attributable to other than natural causes shall not reduce light transmission to the point that the normal growth, function, or reproduction of aquatic life is impaired or that will cause substantial visible contrast with the natural appearance of the water.

K. **Salinity**: Where existing information is sufficient, numerical standards for TDS (or conductivity), chlorides and sulfates, have been adopted in 20.6.4.101 through 20.6.4.899 NMAC. The following standards apply at the downstream point of the reach

in which they are set:

(1) For the tributaries of the Colorado river system, the state of New Mexico will cooperate with the Colorado river basin states and the federal government to support and implement the salinity policy and program outlined in the report "1999 Review, water quality standards for salinity, Colorado river system."

(2) Numeric criteria for salinity are established at three points in the Colorado river basin as follows: below Hoover dam, 723 mg/L; below Parker dam, 747 mg/L; and at Imperial dam, 879 mg/L.

(3) As a part of the program, objectives for New Mexico shall include the elimination of discharges of water containing solids in solution as a result of the use of water to control or convey fly ash from coal-fired electric generators, wherever practicable.

(4) In determining compliance with the numeric criteria hereby adopted, salinity (TDS) shall be determined by either the "calculation method" (sum of constituents) or the filterable residue method. Approved test procedures for these determinations are as set forth in 20.6.4.13 NMAC.

L. **Dissolved Gases**: Surface waters of the state shall be free of nitrogen and other dissolved gases at levels above 110 percent saturation when this supersaturation is attributable to municipal, industrial or other discharges.

[20.6.4.12 NMAC – Rp 20 NMAC 6.1.1105, 10-12-00; A, 10-11-02]

For Standards applicable to Attainable or Designated Uses listed in Section III, see Appendix B.

VI) Assessment Protocols Used to Determine Standards

20.6.4.14 USE ATTAINABILITY ANALYSIS:

A. A use attainability analysis is a scientific study which shall be conducted only for the purpose of assessing the factors affecting the attainment of a use. Whenever a use attainability analysis is conducted, it shall be subject to the requirements and limitations set forth in 40 CFR Part 131, Water Quality Standards; specifically, Subsections 131.3(g), 131.10(g), 131.10(h) and 131.10(j) shall be applicable as follows:

(1) The department must conduct a use attainability analysis whenever it proposes to classify a surface water of the state with designated uses which do not include the uses specified in Section 101(a)(2) of the federal Clean Water Act. Section 101(a)(2) uses are also specified in Subsection B of 20.6.4.6 NMAC.

(2) A designated use cannot be removed if it is an existing use.

(3) A use attainability analysis or an equivalent study approved by the department and the regional administrator must be conducted to remove any non-existing designated use from any classified waters of the state.

B. Any person proposing to conduct a use attainability analysis or equivalent study shall publish notice of this intent in a newspaper of local and statewide circulation. The cost of publication shall be the responsibility of the person proposing such action. The

notice shall describe the surface water of the state and uses to be assessed, identify the persons to contact for complete information, and describe how interested persons can participate in the use attainability analysis or equivalent study.

C. Any person may submit a petition to the department stating that they intend to conduct a use attainability analysis or equivalent study. At a minimum, the department, the New Mexico game and fish department, the state engineer and the U.S. fish and wildlife service shall be consulted during the development of a work plan for such analysis or equivalent study. The petitioner shall develop a work plan to conduct the use attainability analysis or equivalent study and shall submit the work plan to the department and the regional administrator of the EPA for review and approval. A copy of the petition and the work plan must be submitted concurrently to the commission. Upon approval of the work plan by the department and the regional administrator, the petitioner shall conduct the use attainability analysis or equivalent study in accordance with the approved work plan. The cost of such analysis or equivalent study shall be the responsibility of the petitioner.

D. Physical, chemical and biological evaluations of surface waters of the state other than lakes and reservoirs for purposes of use attainability analyses or equivalent studies shall be conducted according to the procedures outlined in the "Technical support manual: waterbody surveys and assessments for conducting use attainability analyses," United States environmental protection agency, office of water, regulations and standards, Washington, D.C., November 1983, or latest edition thereof, which is incorporated herein by reference, or an alternative equivalent study methodology approved by the department.

E. Physical, chemical and biological evaluations of lakes and reservoirs for purposes of use attainability analyses or equivalent studies shall be conducted according to the procedures outlined in the "Technical support manual: waterbody surveys and assessments for conducting use attainability analyses, volume III: lake systems," United States environmental protection agency, office of water, regulations and standards, Washington, D.C., November 1984, or latest edition thereof, which is incorporated herein by reference, or an alternative equivalent study methodology approved by the department.

F. A use attainability analysis or equivalent study should include any applicable information concerning the following:

(1) identification of existing uses of the surface water of the state to be reviewed which have existed since 1975;

(2) an evaluation of the best water quality attained in the surface water of the state to be reviewed which has existed since 1975;

(3) a technological analysis which identifies available treatment options for point and nonpoint sources to meet applicable water quality standards for the designated uses;

(4) an economic analysis which evaluates social and economic impacts associated with available treatment options;

(5) a physical and biological evaluation of the surface water of the state to be reviewed to identify any factors unrelated to water quality which impair attainment of designated uses and to determine which designated uses are feasible to attain in such surface water of the state given existing physical limitations;

(6) an evaluation of the water chemistry of the surface water of the state to be reviewed to identify chemical constituents which impair the designated uses which are

feasible to attain in such water; and

(7) an evaluation of the aquatic and terrestrial biota utilizing the surface water of the state to determine resident species and which species could potentially exist in such water if physical and chemical factors impairing a designated use are corrected.

G. Upon completion of the use attainability analysis or equivalent study, the petitioner shall submit to the department and the commission the data and their findings and conclusions. If the department determines that the analysis or equivalent study was conducted in accordance with the approved work plan and the findings and conclusions are based upon sound scientific rationale, and demonstrates that it is not feasible to attain the designated use, the department shall request authority from the commission to initiate rulemaking proceedings to modify the designated use for the surface water of the state that was reviewed.
[20.6.4.14 NMAC – Rp 20 NMAC 6.1.1107, 10-12-00]

For the mathematical equations used for the determination of numeric standards for the substances listed see Appendix C. Determining the use of a waterbody or segment is key to determining the standards that waterbody should be able to attain.

VII) Stream Segmentation System

New Mexico Waters are segmented within 8 river basins based on their Designated Uses. Details can be found in the STATE OF NEW MEXICO STANDARDS FOR INTERSTATE AND INTRASTATE SURFACE WATERS. The segmentation and listing in the Standards are as follows:

Designation and Standards

20.6.4.101	Rio Grande Basin
20.6.4.201	Pecos River Basin
20.6.4.301	Canadian River Basin
20.6.4.401	San Juan River Basin
20.6.4.501	Gila River Basin
20.6.4.601	San Francisco River Basin
20.6.4.701	Dry Cimarron River
20.6.4.801	Closed Basins

For an example of such segmentation see Appendix D.

These standards are applicable to the designated uses unless otherwise specified for certain waterbody stretches as seen in Appendix D. Designated Use standards are listed in the New Mexico Standards for Interstate and Intrastate Surface Waters. Subsections referred to in these descriptions (M-P; numeric criteria of pollutants, total ammonia, and dissolved oxygen) can be found in 20.6.4.900 of the Standards.

These segmentations and their standards can be found at
http://www.nmenv.state.nm.us/NMED_regs/swqb/20_6_4_nmac.html#8

VIII) Treatment of Water Column

The quality of the water column of New Mexico water bodies is regulated under the basic standards listed in section V or in site specific standards listed in section VII. See also the tables in Appendix A from the State of New Mexico Procedures for Assessing Standards Attainment for 303(d) list and 305(b) report.

IX) Treatment of Physical Habitat

Physical habitat parameters are monitored on New Mexico streams at the same time benthic macroinvertebrates are sampled. This information is used mostly for determination of similarities in streams for reference comparisons, rather than for standard development. Narrative descriptions of physical habitat supporting aquatic life to different degrees can be found in the tables in Appendix A.

X) Treatment of Sediment

The current standard for the deposition of material on the bottom of a stream channel is listed in the *State Of New Mexico Standards for Interstate and Intrastate Surface Waters*, Section 1105.A General Standards:

> Bottom Deposits: Surface waters of the State shall be free of water contaminants from other than natural causes that will settle and damage or impair the normal growth, function, or reproduction of aquatic life or significantly alter the physical or chemical properties of the bottom.

The protocol was developed to support an interpretation of the New Mexico State Water Quality Standards (NMWQCC, 2000) narrative standard for stream bottom deposits. The protocol is similar to the approach proposed by the State of Colorado (CDPH&E, 1998) and represents a simple, but quantitative, three-step assessment procedure for determining whether the above narrative standard is being attained in a particular stream reach or segment by:

1) comparing changes or differences, if any, between the site of concern and a reference site;

2) directly evaluating instream habitat by measuring either of two stream bottom substrate parameters or indicators, namely substrate size (mainly fines, 2 mm or less) abundance or cobble embeddedness, and;

3) verifying or confirming results obtained in number 2 by assessing and comparing benthic macroinvertebrate communities (or fish) at the same sites.

This protocol is not designed to determine sources, locations, quantities, or causes of excess stream bottom sediment.

- The protocol for assessment of stream bottom deposits can be found at http://www.nmenv.state.nm.us/swqb/protocols/StreamBottomProtocol.pdf

- This protocol was also added to Appendix D of the New Mexico CWA for your convenience.

XI) Treatment of Biological

The state is in the process of developing biological criteria. There is now an assessment protocol which is used for determining waterbody assessments for purposes of Sections 305(b) and 303(d) of the Clean Water Act. This information may be obtained by calling David Hogge, New Mexico's TMDL contact. Benthic macroinvertebrate sampling protocols can be found at http://www.nmenv.state.nm.us/swqb/protocols/Benthic_Macroinvertebrates_Protocol.pdf

New Mexico Environment Department's (NMED) has recently begun to survey fish populations to supplement the data from the NM Department of Game and Fish. NMED uses RBP collection methods and is currently working on assessment methods suitable for the depauperate fish population of New Mexico. The SWQB coordinates with the NM Department of Game and Fish to obtain the most current fishery assessments in the watersheds.

The benefits of this approach are:

- It provides a systematic, detailed review of water quality data and allows for a more efficient use of valuable monitoring resources;
- It provides information at a scale where implementation of corrective activities is feasible;
- With an established order of rotation and predictable sampling in each basin, it is easier to coordinate efforts with other programs and water quality entities, and program efficiency is enhanced and the basis for management decisions is improved.

See also the tables in Appendix A from the State of New Mexico Procedures for Assessing Standards Attainment for 303(d) list and 305(b) report regarding bioassessment.

For an overview of New Mexico's Biological Monitoring Program see Appendix E

XII) Treatment of Wetlands

For information on the Treatment of Wetlands in New Mexico, see a separate document entitled "Treatment of Wetlands by State."

XIII) 305b Reports

Section 305(b) of the Clean Water Act requires that states, territories, and jurisdictions assess their water quality biennially and report those findings to the U.S. Environmental Protection Agency (EPA). EPA then summarizes the findings in a national water quality inventory. It is important to note that this report is no longer a Report to Congress, pursuant to Public Law 104-66, the Federal Reports Elimination and Sunset Act of 1995. To assess water quality, states and other jurisdictions compare their monitoring results to the water quality standards they have set for their waters. Water quality standards consist of three elements: the designated uses assigned to waters (such as drinking, swimming, or fishing), criteria to protect those uses (such as chemical-specific thresholds that should not be exceeded), and an antidegradation policy intended to keep waters that *do* meet standards from deteriorating from their current condition.

For the 2002 New Mexico 305(b) report see
http://www.nmenv.state.nm.us/swqb/305b/2002/index.html
This data is compiled into the National Water Quality Inventory biennially. The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

The 2002 National Water Quality Inventory is the latest report available and can be accessed at www.epa.gov/305b/2000report/alhi.pdf

XIV) 303d lists

Section 303(d) of the Clean Water Act requires states to identify those water bodies, which are impaired by one or more pollutants or which are not attaining aquatic use designations due to biological information. Total Maximum Daily Loads ("TMDLs") are required for each listed water body.

The list is organized by waterbody, and the columns include:

1) WATER BODY NAME (Basin, segment) EVALUATED OR MONITORED (E/M), SUPPORT STATUS WBS NUMBER

2) TOTAL SIZE AFFECTED (MILES WITHIN STATE OF NM JURISDICTION)

3) PROBABLE SOURCE(s) OF POLLUTANT

4) TMDL SCHEDULE (DATE TMDL DUE)

5) # OF NPDES PERMITS ON THE REACH

6) USES NOT FULLY SUPPORTED

7) SPECIFIC POLLUTANT(s)

8) TOXICS AT ACUTE LEVELS

9) TOXICS AT CHRONIC LEVELS

10) AQUATIC T or E SPECIES ON THE REACH

11) ACUTE PUBLIC HEALTH CONCERN (YES/NO)

12) PRIORITY

Section 303(d) of the CWA currently requires that each state rank by priority their water quality-limited (WQL) waters. NM Environment Department (NMED) satisfies this requirement by classifying WQL waterbodies as higher priority waterbodies and lower priority waterbodies. NMED will utilize its professional judgment and ranking factors (1-4) in targeting higher priority waterbodies for TMDL development.) When setting priorities, states must consider the uses of identified waters and the severity of the pollution. The section 303(d) process allows EPA and the states to focus on problem watersheds in priority order. It also provides a process to find the most cost-effective solution to water quality problems in a watershed by allowing trade-offs among sources.

For New Mexico's 2000-2002 303(d) list see
http://www.nmenv.state.nm.us/swqb/2000-2002_New_Mexico_303d_List.pdf

For an example page of the 2000-2002 303(d) list see Appendix G

XV) Assessment protocols for listing and delisting

EPA will review and approve, partially approve/disapprove, or disapprove state or territorial 303(d) lists of impaired and threatened waterbodies requiring a TMDL (Category 5). EPA's review and approval of the 303(d) list will be based on a determination that the state's or territory's assessment and listing methodology was used to prepare the list, that the assessment and listing methodology is scientifically sound, that it is consistent with the state's or territory's water quality standards, and that the state or territory reasonably considered all existing and readily available data and information, and listed all waters not attaining water quality standards. Upon completing its review of the 303(d) list, EPA will send a letter to the state or territory notifying it of full approval, partial approval/disapproval, or disapproval. If the list is partially approved/disapproved, or disapproved, EPA will develop a list for the state or territory. EPA will also provide 30 days for public comment on the EPA developed list.
In New Mexico, listing and delisting decisions are made based on the evaluation of waterbodies using both a monitored assessment and an evaluated assessment. Numeric data and narrative observations from these assessments are ranked on a four tiered scale for their data confidence level. Based on this information and a waterbody's designated use, it may be listed or delisted from the 303(d) list accordingly.

More information on New Mexico's 303(d) listing and delisting protocols can be found in Appendix H.

XVI) Assessment for National Point Source Discharge Elimination System (NPDES) permits

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

New Mexico is not a delegated permit authority.

For a list of permits issued for discharge into New Mexico waters see http://www.nmenv.state.nm.us/swqb/psrlist.html

XVII) Resources

River Network: http://www.rivernetwork.org/index.cfm

State-by-State Clean Water Act: http://www.rivernetwork.org/cleanwater/cwa_search.asp

National Water Quality Control Council (NWQCC); data comparability and collaboration: http://wi.water.usgs.gov/pmethods/mdcbfs.pdf

NWQCC minimum list of metadata elements: http://wi.water.usgs.gov/pmethods/elements/list.htm

For a copy of the National Water Quality Inventory:2000 Report (EPA-841-R-02-001), visit www.epa.gov/305b/2000report/alhi.pdf or call the EPA's National Service Center for Environmental Publications at 1-800-490-9198

New Mexico Environment Department Surface Water Quality Bureau: http://www.nmenv.state.nm.us/swqb/index.html

New Mexico Standards for Interstate and Intrastate Surface Waters: http://www.nmenv.state.nm.us/NMED_regs/swqb/20_6_4_nmac.html#8

The New Mexico Water Quality Management Plan: http://www.nmenv.state.nm.us/swqb/Planning/Water_Quality_Management_Plan/WQMP_05_13_03.pdf
New Mexico's 2000-2002 303(d) list http://www.nmenv.state.nm.us/swqb/2000-2002_New_Mexico_303d_List.pdf

State of New Mexico Procedures for Assessing Standards Attainment for 303(d) list and 305(b) report: http://www.nmenv.state.nm.us/swqb/protocols/AssessmentProtocol.pdf

Surface Water Quality Bureau Library:
http://www.nmenv.state.nm.us/swqb/links.html#WPS_Library

For a list of and links to *Reports and Publications*, go to:
http://www.nmenv.state.nm.us/gwb/Technical%20resources/TSS.html#Reports

The Process For Developing Total Maximum Daily Loads For Point Source Wasteload Allocations And Nonpoint Source Load Allocations With The Methodology For Stream Reach Ranking In The State of New Mexico:
http://www.nmenv.state.nm.us/swqb/Prioritization.html

EPA National TMDL home page: This site provides an overview of the national TMDL program with links to pertinent information on state programs. It includes information on TMDL laws and regulations, policies, documents, examples of TMDLs, and more.
www.epa.gov/owow/tmdl

Adopt Your Watershed: Learn about organizations active in your watershed! Over 4,000 watershed groups are listed. Also includes tools and resources to help new groups get started. Visit EPA's Adopt Your Watershed site at www.epa.gov/adopt/

Surf Your Watershed: This site provides multi-level water resource information. Enter your zip code and learn the facts about your watershed and ways you can get involved. Visit EPA's Surf Your Watershed site at www.epa.gov/surf

XVIII) Glossary

Acronyms

- CWA – Clean Water Act
- EPA – Environmental Protection Agency
- FIFRA – Federal Insecticide, Fungicide, and Rodenticide Act
- IRIS – Integrated Risk Information System
- NMED – New Mexico Environment Department's
- NMPCA – New Mexico Pesticide Control Act
- NPDES – National Pollutant Discharge Elimination System
- RBP – Rapid Bioassessment Process
- SWQB – Surface Water Quality Bureau
- TDS – Total Dissolved Solids
- TMDLs – Total Maximum Daily Loads

- WQCC – Water Quality Control Commission
- WQL – Water Quality-limited
- WQS – Water Quality Standards

Clean Water Act Words (Section 1)

Regular font definition found in state documents, italic font definitions not directly found in state documents and thus might be different

- Acute Toxicity – means toxicity involving a stimulus severe enough to induce a response in 96 hours of exposure or less. Acute toxicity is not always measured in terms of lethality, but may include other toxic effects that occur within a short time period.
- Benthic Macroinvertebrates – *organisms that reside the majority of their life cycle on the bottom of running water ecosystems such as rivers. Some benthic taxa are also found in wetland and lake environments. These organism are excellent indicator species, they are easy and cheap to collect and are exposed to pollutants and environment in a variety of life cycles.*
- Bioaccumulation – refers to the uptake and retention of a substance by an organism from its surrounding medium and food.
- Bioaccumulation Factor – is the ratio of a substance's concentration in tissue versus its concentration in ambient water, in situations where the organism and the food chain are exposed.
- Biota – *having to do with living organisms, biota of a stream for example*.
- Chronic Toxicity – means toxicity involving a stimulus that lingers or continues for a relatively long period relative to the life span of an organism. Chronic effects include, but are not limited to, lethality, growth impairment, behavioral modifications, disease and reduced reproduction.
- Endangered Species – *see state and federal definitions and lists for species that are threatened to become extinct.*
- Non-point Sources – means any source of pollutants not regulated as a point source which degrades the quality or adversely affects the biological, chemical, or physical integrity of surface waters of the state.
- Numeric Standards – (Refer to Section B under the Triennial Review) *The suitable limit (numeric level) of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control Commission.*

- Point Sources – means any discernible, confined, and discrete conveyance from which pollutants are or may be discharged into a surface water of the state, but does not include return flows from irrigated agriculture.

- Salinity – *of relating to or containing salt or a form of salt that potentially could be toxic to aquatic life.*

- Salmonella species – *any of various non-motile rod-shaped bacteria of the genus Salmonella, which are pathogenic, causing food poisoning, and the like*

- Shigella species – *any of various non-motile rod-shaped bacteria of the genus Shigella, which includes some species that cause dysentery.*

- State Water Quality Act – *New Mexico's version of the Federal Clean Water Act.*

- Surface Waters – means all interstate waters including interstate wetlands, and all intrastate waters, such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, reservoirs or natural ponds the use, degradation, or destruction of which would affect interstate or foreign commerce. Surface waters of the state also means all tributaries of such waters, including adjacent wetlands, and any manmade bodies of water which were originally created in surface waters of the state or resulted in the impoundment of surface waters of the state. Surface waters of the state does not include private waters that do not combine with other surface or subsurface water or any water under tribal regulatory jurisdiction pursuant to § 518 of the Clean Water Act. Waste treatment systems, including treatment ponds or lagoons designed to meet requirements of the Clean Water Act (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition), are not surface waters of the state, unless they were originally created in surface waters of the state or resulted in the impoundment of surface waters of the state.

- Threatened Species – *see state and federal definitions and lists for species that are threatened to become endangered.*

- Triennial Review Process – *Federal and Colorado Clean Water Act requires that criteria, designated uses and segmentation are reviewed for each major basin in a three year rotating cycle (hence triennial review).*

- Turbidity – is an expression of the optical property in water that causes incident light to be scattered or absorbed rather than transmitted in straight lines.

- Water Quality Management Plan – *See document, but the state strategy for water quality management.*

- Water Quality Standards – *means a narrative and/or numeric restriction established by the Commission applied to state surface waters to protect one or more beneficial uses of such waters. Whenever only numeric or only narrative standards are intended, the wording shall specifically designate which is intended.*

Antidegradation Policy (Section 2)

- BMPs – Best Management Practices
- ONRWs – Outstanding National Resource Waters

New Mexico Wetlands (Section 3)

- Ephemeral – means a stream or reach of a stream that flows briefly only in direct response to precipitation or snowmelt in the immediate locality; its channel bed is always above the water table of the region adjoining the stream and does not support a self-sustaining population of fish.

XIX) Appendices

Appendices A through H are referenced the throughout the previous chapters of this document. Sources of the information and the associated websites are listed in chapter XX.

Appendix A
Designated Uses

2.1.6 Assessing chronic WQS when composite data is unavailable

During the 2000 and 2001 SWQB intensive watershed surveys, the sampling regime consisted of two consecutive days of sampling in the spring, three days in the summer, and three days in the fall in order to gather consecutive day data. Starting with the 2002 SWQB intensive watershed survey, the sampling regime was adjusted to sample once per month over an eight-month period in order to 1) better characterize the waterbody throughout most of the hydrograph, and 2) acquire data points that are statistically independent with respect to time. Because of this sampling scheme, consecutive-day data is usually not available to calculate 4-day averages. Few states and tribes are obtaining composite data over a 4-day sampling period for comparison to chronic criteria due primarily to budgetary and staff time constraints. USEPA believes that 4-day composites are not an absolute requirement for evaluating whether chronic criteria are being met when determining use attainment status. Therefore, USEPA affords states and tribes the flexibility to define how they will assess use attainment when 4-day composite data are not available (USEPA 1997). If consecutive day data are not available, a chronic screening level of 1.5 times the chronic criterion will first be calculated. The multiplier of 1.5 was also derived as a way of addressing small data sets (USEPA 1991). This chronic screening level value will then be compared to individual grab sample results as explained in the assessment tables (Section 3.0).

2.2 Data Quality Levels

2.2.1 Aquatic life use data types

It is recognized that not all data of a certain type are of equal quality or rigor. The following tables describe defined levels of data quality or confidence for each type of data recognized for use in making aquatic life support determinations. These tables are adapted from the *Consolidated Assessment and Listing Methodology: Towards a Compendium of Best Practices* guidance document (USEPA 2002a). Tables for determining the level of confidence for biological, habitat, chemical/physical, and toxicological data types are presented. It is necessary to evaluate data quality when assessment performed with more than one data type result in conflicting use attainment decisions (see Section 3.1.4 for more detail). These tables are included only for aquatic life use determinations because it is the only use for which multiple data types are currently recognized. While data quality tables are not available for other designated uses, it is possible to apply the general guidelines to other data to determine if they are of sufficient quality to support use designations. For example, the table for chemical/physical determinations may be used to assign a level of confidence to data used for making a determination of drinking water supply use attainment.

Tables 2.1 through 2.4 classify the data level or rigor of a data type by its technical components and describe the level of effort (spatial or temporal coverage) necessary to achieve each level. Level 4 represents data of the highest rigor and the highest level of confidence while Level 1 represents the lowest acceptable level of confidence. Information of data confidence is housed in ADB v.2.

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Monitoring & Assessment Design Workbook

Table 2.1 Hierarchy of bioassessment approaches for evaluation of aquatic life use attainment

LEVEL OF INFO	TECHNICAL COMPONENTS	SPATIAL/TEMPORAL COVERAGE	DATA QUALITY
1 LOW	Visual observation of biota; reference conditions not used; simple documentation	Limited monitoring; extrapolation from other sites	Unknown or low precision and sensitivity; professional biologist not required.
2 FAIR	One assemblage (usually invertebrates); reference conditions pre-established by professional biologist; biotic index or narrative evaluation of historical records	Limited to a single sampling; limited sampling for site-specific studies; identifications to family level	Low to moderate precision and sensitivity; professional biologist may provide oversight
3 GOOD	Single assemblage usually the norm; reference conditions may be site specific, or composite of sites; biotic index (interpretation may be supplemented by narrative evaluation of historical records)	Monitoring of targeted sites during a single season*; may be limited sampling for site-specific studies; may include limited spatial coverage for watershed-level assessments; identifications to genus and species level	Moderate precision and sensitivity; professional biologist performs survey or provides training for sampling; professional biologist performs assessment
4 EXLNT	Generally two assemblages, but may be one if high data quality; regional (usually based on sites) reference conditions used; biotic index (single dimension or multi metric index)	Monitoring during 2 sampling seasons*; broad coverage of sites for either site-specific or watershed assessments; identifications to genus and species level; conducive to regional assessments using targeted or probabilistic design	High precision and sensitivity; professional biologist performs survey and assessment

NOTES: *Seasons are defined as October – December, January – March, April – June, and July – September.

Table 2.2 Hierarchy of habitat assessment approaches for evaluation of aquatic life use attainment

LEVEL OF INFO	TECHNICAL COMPONENTS	SPATIAL/TEMPORAL COVERAGE	DATA QUALITY
1 LOW	Visual observation of habitat characteristics; no true assessment; documentation of readily discernable land use characteristics that might alter habitat quality; no reference conditions	Sporadic visits; sites are mostly from road crossings or other easy access	Unknown or low precision and sensitivity; professional scientist not required.
2 FAIR	Visual observation of habitat characteristics and simple assessment; use of land use maps for characterizing watershed condition; reference conditions pre-established by professional scientist	Limited to annual visits non-specific to season; generally easy access; limited spatial coverage and/or site-specific studies	Low precision and sensitivity; professional scientist not involved, or only by correspondence
3 GOOD	Visual-based habitat assessment using standard operating procedures (SOPs); may be supplemented with quantitative measurements of selected parameters; conducted with bioassessment; data on land use may be compiled and used to supplement assessment	Assessment during single season usually the norm; spatial coverage may be limited sampling or broad and commensurate with biological sampling; assessment may be regional or site-specific	Moderate precision and sensitivity; professional scientist performs survey or provides oversite and training
4 EXLNT	Assessment of habitat based on quantitative measurements of instream parameters, channel morphology, and floodplain characteristics; conducted with bioassessment; data on land use compiled and used to supplement assessment; reference condition used as a basis for assessment	Assessment during 1-2 seasons; spatial coverage broad and commensurate with biological sampling; assessment may be regional or site-specific	High precision and sensitivity; professional scientist performs survey and assessment

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Table 2.3 Hierarchy of chemical/physical data levels for evaluation of use attainment

LEVEL OF INFO	TECHNICAL COMPONENTS	SPATIAL/TEMPORAL COVERAGE	DATA QUALITY
1 LOW	Any one of the following: • Water quality monitoring using grab sampling • Water data extrapolated from up stream or downstream station where homogeneous conditions are expected • BPJ based on land use data, location of sources	Low spatial and temporal coverage: • Quarterly or less frequent sampling with limited period of record (e.g., 1 day) • Limited data during key periods or at high or low flow (critical hydrological regimes) • Data are >5 years old and likely not reflective of current conditions	Approved QA/QC protocols are not followed or QA/QC results are inadequate Methods not documented Inadequate metadata
2 FAIR	Any one of the following: • Water quality monitoring using grab sampling • Rotating basin surveys involving single visits • Synthesis of existing or historical information on fish tissue contamination levels • Screening models based on loadings data (not calibrated or verified) • Verified volunteer monitoring data	Moderate spatial and temporal coverage: • Bimonthly or quarterly sampling at fixed stations • Sampling during a key period (e.g. fish spawning seasons, high and/or low flow) • Stream basin coverage, multiple sites in a basin	Low precision and sensitivity QA/QC protocols followed, QA/QC results adequate Approved SOPs used for field and lab; limited training Adequate metadata
3 GOOD	Any one of the following: • Water quality monitoring using grab sampling • Rotating basin surveys involving multiple visits or automatic sampling • Calibrated models (calibration data <5 years old) • Limited use of continuous monitoring instrumentation	Broad spatial and temporal coverage of site with sufficient frequency and coverage to capture acute events: • Monthly sampling during key periods (e.g. critical hydrological regimes and fish spawning seasons), multiple samples at high and low flows • Period of sampling adequate to monitor for chronic concerns* • Lengthy period of record for fixed station sites (sampling over a period of months)	Moderate precision and sensitivity QA/QC protocols followed, QA/QC results adequate Approved SOPs used for field and lab Adequate metadata
4 EXLNT	All of the following: • Water quality monitoring using composite samples, series of grab samples, and continuous monitoring devices • Limited follow-up sediment quality sampling or fish tissue analyses at sites with high probability of contamination	Broad spatial coverage (several sites) and temporal (long-term, e.g. 5-years) coverage of fixed sites with sufficient frequency and coverage to capture acute events, chronic conditions, and all other potential chemical/physical impacts: • Monthly sampling during key periods (e.g., spawning, critical hydrological regimes) including multiple samples at high and low flows • Continuous monitoring (e.g. use of thermographs, sondes, or similar devices)	High precision and sensitivity QA/QC protocols followed, QA/QC results adequate Approved SOPs used for field and lab; samplers well trained Adequate metadata

NOTE: *See section 2.1.6 for additional information.

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Table 2.4 Hierarchy of toxicological approaches and levels for evaluation of aquatic life use attainment

LEVEL OF INFO	TECHNICAL COMPONENTS	SPATIAL/TEMPORAL COVERAGE	DATA QUALITY
1 LOW	Any one of the following: • Acute or chronic WET for effluent dominated channel • Acute ambient • Acute sediment	1 ambient or sediment sample tested in an assessment unit or site	Unknown/Low; minimal replication used; laboratory quality or expertise unknown
2 FAIR	Any one of the following: • Acute or chronic ambient • Acute sediment • Acute and chronic WET for effluent dominated channel • Chronic ambient or acute or chronic sediment	2 ambient or sediment sample tested in an assessment unit or site on 2 different dates	Low/moderate; little replication used within a site; laboratory quality or expertise unknown or low
3 GOOD	Any one of the following: • Acute and chronic WET for effluent dominated system • Chronic ambient or acute or chronic sediment	3 ambient or sediment sample tested in an assessment unit or site on 3 different dates	Moderate/high; replication used; trained personnel and good laboratory quality
4 EXLNT	Both of the following: • Acute and chronic ambient and • Acute or chronic sediment	≥ 4 tests in total based on samples collected in a assessment unit or site on 4 different dates	High; replication used; trained personnel and good lab quality

2.2.2 Contact use data type

Pathogen data is used to make determine use support for Primary Contact and Secondary Contact designated uses. ADB v.2 also houses information on pathogen data quality levels. Pathogen data typically consists of fecal coliform and/or E. coli data. The CALM guidance does not contain any examples of data quality criteria to discern low to excellent data quality (USEPA 2002a). In reality, there is no need to evaluate pathogen data quality because there cannot be conflicting contact use attainment conclusions from various types of data as there can in aquatic life use attainment decisions. The only data type used to make contact use attainment decisions in New Mexico is pathogen data because there are no contact use water quality standards for non-pathogen data.

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3.0 Individual Designated Use Support Determinations

Water Quality Standards (WQS) are actually a triad of elements that work in concert to provide water quality protection. These three elements are: designated uses, numerical and narrative criteria, and an antidegradation policy. Designated uses are the defined the uses of a particular surface water body. Each water body has several designated uses. For example, Domestic Water Supply is a designated use. Designated use definitions and their assignment to various stream segments in New Mexico can be found in the *Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC). Numeric and narrative criteria have been adopted to protect these designated uses. There are both site-specific criteria and use-specific criteria in New Mexico's WQS document. All references to criteria throughout this document refer to these state-adopted, USEPA-approved numerical limits found in 20.6.4. NMAC. The antidegradation policy ensures that existing uses and levels of water quality necessary to protect these uses will be maintained and protected (NMAC 20.6.4.8).

WQS segments defined in NMAC 20.6.4 are further divided into assessment units (AUs) for use impairment determination and linked to the National Hydrographic Dataset (NHD) for national electronic reporting requirements. AUs are stream reaches, lakes, or reservoirs defined by hydrologic boundaries, WQS, geology, topography, incoming tributaries, surrounding land use/ land management, etc. As stated in Section 1.0, data collected at representative stations during SWQB intensive surveys along with outside data form the basis of use support determinations for each AU. Stations are chosen to reflect current ambient conditions. The following subsections provide guidelines used to interpret available data. These guidelines will be used to make determinations of use support for each designated use in each AU, utilizing the previously described data sets. Some level of flexibility is built into these guidelines to account for uncertainties such as the natural variability of water quality, the lack of extensive data necessary to make more definitive assessments, and the transitory nature of many pollutants. Each designated use has one or more tables with specific requirements for determining use attainment based on the type of data being evaluated. Each type of data is first evaluated separately when determining aquatic life use support. Guidance on how to reconcile two or more data types with differing use attainment determinations is found in Section 3.1.4. In addition to the following subsections, several specific assessment protocols for temperature, sedimentation/siltation (stream bottom deposits), nutrients, dissolved oxygen, and pH have been developed. These protocols are included in appendices C through G.

In previous New Mexico §305(b) reports and §303(d) lists, five designated use determinations were possible according to earlier versions of the SWQB assessment protocol: Full Support, Full Support Impacts Observed, Partial Support, Not Supported, or Not Assessed. These determinations were modified from recommendations in the §305(b) report guidance (USEPA 1997). The most recent guidance from USEPA recommends the following use attainment categories (USEPA 2001, USEPA 2002a, USEPA 2003): **Fully Supporting, Not Supporting, Insufficient Information, and Not Assessed.** For every assessment unit, one of these four categories is assigned to every designated use applicable to that given assessment unit.

No determination of Fully Supporting or Not Supporting may be made in the absence of monitored data. It is understood that any assessment, particularly when using biological and/or habitat data, may involve some level of best professional judgment (BPJ). However, evaluations based solely on professional judgment, literature statements, or public comments without reliable data to support the decision shall not be the only basis for a listing or de-listing. For segments where there are no monitored data but for which reliable and documented evaluated data that suggest impairment, the potential impairment will be noted in the "Observed Effects" portion of ADB v.2. To those AUs for which there are no reliable monitored data for any criteria within an applicable designated use, a designation of Not Assessed will be assigned that designated use.

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3.1 Assessing Aquatic Life Use Support

Use assessment decisions should consider and integrate, whenever possible and appropriate, results of various monitoring data types. These include biological, habitat/stream channel condition, chemical/physical, and toxicological monitoring data. Data quality associated with these types can be found in Section 2.1.1.

3.1.1 Biological and habitat data

Table 3.1 explains how interpret biological and habitat data to assess aquatic life use support. Currently benthic macroinvertebrate sampling is the primary form of biomonitoring utilized by the state of New Mexico. SWQB also monitors fish assemblages and algae in a limited number of streams. Expanded assessment protocols for sedimentation/siltation (stream bottom deposits) and plant nutrient narrative criteria that incorporate benthic macroinvertebrate sampling can be found in Appendices D and E, respectively. To determine impairment due to excessive sedimentation, the assessment approach is based on the concept of comparing the actual conditions of a specific stream with the expected conditions (i.e., reference stream) to determine use attainment of the narrative stream bottom deposit standard. This rapid bioassessment protocol (RBP) approach is consistent with USEPA guidance.

When the RBP method was first introduced, the concept of reference condition was typically limited to pristine streams (Plafkin et al. 1989). This concept was updated to acknowledge the reality of a wider range of aquatic conditions that reflect more than minimal impacts, including historic and dominate land and water use activities (Barbour et al. 1999). This broader definition of reference condition still allows for the definition of reasonable and attainable targets or goals to assess potential impairment to the aquatic community. Full utilization of this updated approach requires state and tribes to develop their own region-specific biocriteria. SWQB is in the process of reassessing and refining current biomonitoring and habitat assessment protocols to better determine reference conditions in New Mexico surface waters and to eventually determine numeric biocriteria. The process of developing biocriteria began in 2002 with assistance from USEPA Region 6 and TetraTech.

While biocriteria is not yet developed to assess numeric criteria, we continue to utilize benthic macroinvertebrate data to determine attainment of certain narrative criteria, such as excessive sedimentation (i.e., bottom deposits) (Appendix D). Until biocriteria development is complete, we will continue to utilize the guidance percentage listed in the original RBP document (Plafkin et al. 1989) and will limit the use of benthic macroinvertebrates in use support determinations to assessing stream bottom deposits, nutrients, and cases of marginal turbidity exceedences where the exceedences are temporary and due to natural causes (i.e., snowmelt runoff or high intensive summer thunderstorms).

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Table 3.1 Interpreting biological and habitat data to assess Aquatic Life Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•Biological assemblages	Reliable data indicate functioning, sustainable biological assemblages not modified significantly beyond the natural range of reference condition (>83% of reference condition).*	At least one biological assemblage indicates moderate to severe impairment when compared to reference condition (≤79% of reference conditions). *	Currently, these percentages are applied to benthic macroinvertebrates data only. Reference condition is defined as the best situation to be expected within an ecoregion (watershed reference site). Reference sites have balanced trophic structure and optimum community structure (composition & dominance) for stream size and habitat quality.
•Habitat Measurements	• Data indicate channel morphology, substrate composition, bank/riparian structure, and flow regime are similar to reference reach. • The stream has riparian vegetation approaching that of reference reach. • Measurements indicate that the stream geomorphology is similar to reference condition.	• Moderate to severe habitat alteration by channelization and dredging, bank failure, heavy watershed erosion, or alteration of flow. • Removal of riparian vegetation widespread; substantial encroachment of undesirable, non-indigenous species. • Measurements indicate that the stream is extremely unstable -- Type F, G, or D) (Rosgen 1996).	Vegetation may include desirable, non-indigenous species.

NOTE: *Percentages are based on Plafkin et al (1989). The 4% gap allows for some best professional judgment.

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3.1.2 Chemical/physical data

Table 3.2 explains how to interpret chemical/physical data to assess aquatic life use support. Refer to Sections 20.6.4.900.J, 20.6.4.900.M, and 20.6.4.900.N of the Water Quality Standards for the numeric standards for metals, chlorine, and ammonia, respectively, and Sections 20.6.4.900.M for chronic and acute values. Refer to the appropriate stream segment number and the appropriate aquatic life use category in Section 206.4.900 of the Water Quality Standards for numeric standards for conventional chemical/physical parameters. Conventional parameters monitored to determine aquatic life use support include: temperature, turbidity, pH, dissolved oxygen, specific conductance, and total phosphorus. Expanded assessment protocols for temperature when thermograph data is available, and draft large data set protocols for dissolved oxygen (DO), and pH, are found in Appendices C, F, and G respectively. Until the draft protocols are finalized, Table 3.1 will be applied to large dissolved oxygen and pH data sets to determine potential impairment.

Table 3.2 Interpreting chemical/physical data to assess Aquatic Life Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Conventional parameters** (e.g., pH, temperature, DO, specific conductance, turbidity, total phosphorus) **A)** 1 to 7 samples **B)** > 7 samples	**A)** For any one pollutant, no more than one exceedence of the criterion. **B)** For any one pollutant, criterion exceeded in <15% of measurements.	**A)** For any one pollutant, more than one exceedence of the criterion. **B)** For any one pollutant, criterion exceeded in ≥ 15% of measurements.	Biases in DO, pH, and temperature sampling (such as diurnal flux) should be addressed by sampling with continuously-recording sondes and thermographs whenever possible.* Turbidity exceedence attributable to natural causes are not considered exceedences of the criteria.[a] Reference NMAC 20.6.4.12.J for narrative turbidity criteria.
•**Toxic substance** (e.g., priority pollutants, ammonia, chlorine, metals)	For any one pollutant, no more than one exceedence of the acute criterion, and no more than one exceedence of the chronic criterion or chronic screening level in three years.	For any one pollutant, more than one exceedence of the acute criterion, or more than one exceedence of the chronic criterion or chronic screening level in three years.	The **chronic criterion** shall be applied to the arithmetic mean of the analytical results of consecutive-day samples. Consecutive-day samples are often not available. When this is the case, the **chronic screening level** of 1.5 times the chronic criterion shall be first be calculated and then compared to individual grab sample result to determine whether an exceedence has occurred (see Section 2.1.6).

NOTE: *See appendices C, F, and G.
[a]When available, benthic macroinvertebrate data is used to verify that aquatic life is not impaired according to Table 3.1.

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3.1.3 Toxicological data

Table 3.3 explains how to interpret toxicological data to assess aquatic life use support. Refer to NMAC 20.6.4.12.F for the narrative general standards which states "Surface waters of the state shall be free of toxic pollutants from other than natural causes in amounts, concentrations or combinations which affect the propagation of fish…" Toxicity is a valuable indicator for assessing and protecting against impacts on water quality and designated uses caused by the aggregate toxic effect of pollutants. Contaminants may flow directly from industrial and municipal waste dischargers, may come from polluted runoff in urban and agricultural areas, or may collect in the sediments. Toxicity evaluations can be used to assess the type and extent of degraded water quality (USEPA 2002a). Acute toxicities of substances are determined using at least two species tested in whole effluent and/or ambient stream water as well as a series of dilutions.

Table 3.3 Interpreting toxicological data to assess Aquatic Life Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•Acute and/or chronic toxicity testing	Significant effect noted in no more than one acute tests as compared to controls or reference conditions, and in no more than one chronic test in three years as compared to controls or reference conditions.	Significant effect noted in more than one acute tests as compared to controls or reference conditions, or in more than one chronic test in three years as compared to controls or reference conditions.	Significant effect refers to a statistically significant difference as defined in the latest USEPA procedures documents for acute and chronic toxicity testing (USEPA 2002b, 2002c). Reference controls will be used to compensate for possible toxic effects from naturally occurring conditions (i.e. high salinity).

3.1.4 Conflicting aquatic use support determinations

For aquatic life use assessments, it is possible that data of differing types may lead to differing use attainment determinations for the same assessment unit. For example, there may be chemical/physical data that indicate **Not Supporting** and biological data that indicate **Fully Supporting**. If more than two data types are available for assessment, a weight-of-evidence approach will be adopted. This approach will consider data type and data quality in reaching a final aquatic life use determination. Generally, data types with higher data quality will be given more weight. Once biocriteria are fully developed for the state of New Mexico, biological data will be given greater weight than other data types in making use support determinations when data quality levels are comparable, with the exception of toxic chemical data (see Figure 3.1). Biological assessments provide an integrated assessment of ecological health, are not as subject to transient variability as chemical assessments, and provide a direct measure of the designated goal of providing for the protection and propagation of fish, shellfish, and wildlife as stated in the CWA.

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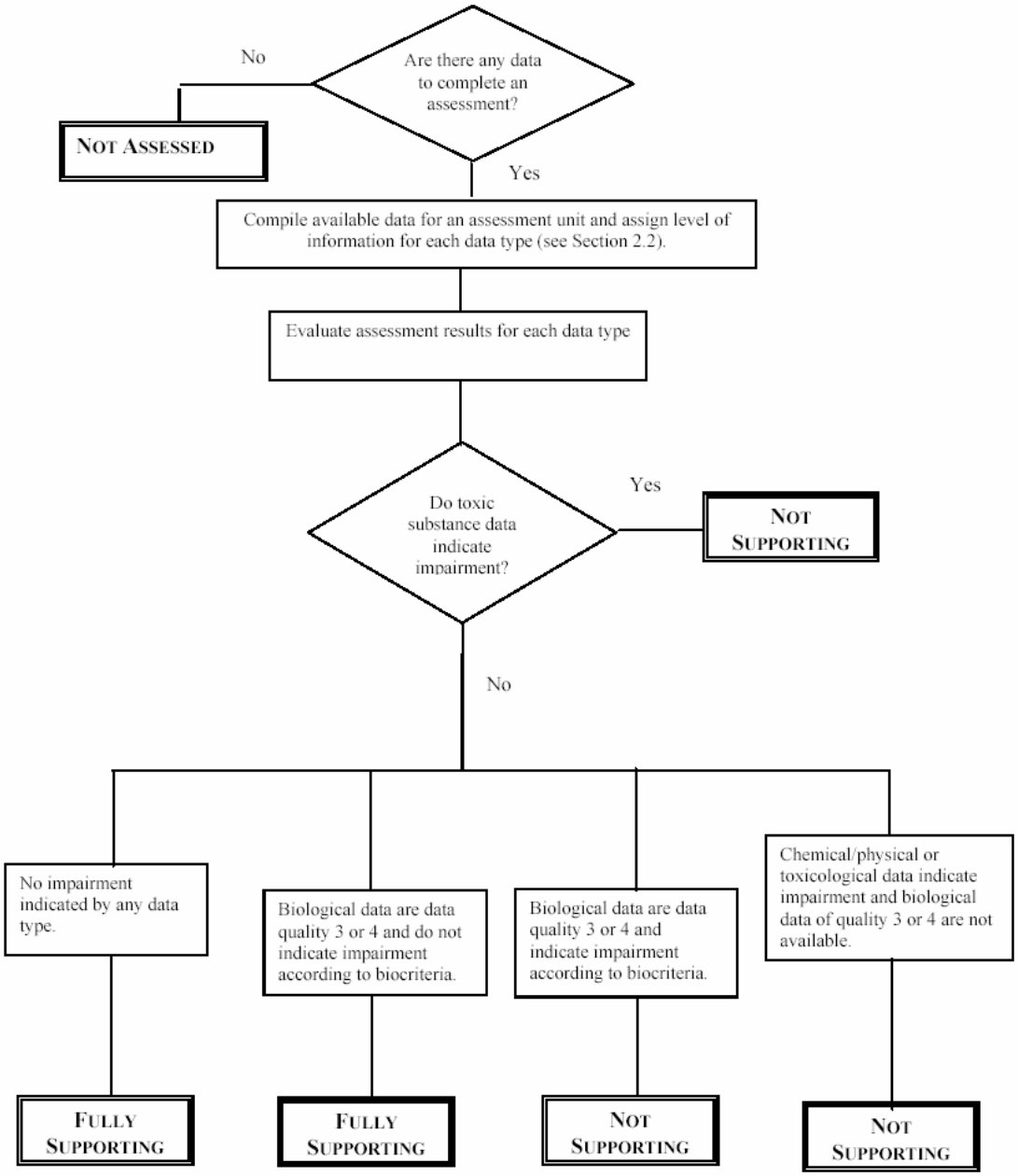

Figure 3.1 General flowchart for determining Aquatic Life Use Support

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3.2 Assessing Domestic Water Supply Use Support

Table 3.4 explains how to interpret chemical/physical data to assess domestic water supply use support Refer to Section 20.6.4.900.B and Section 20.6.4.900.M of the Water Quality Standards for the numeric standards for domestic water supply.

Table 3.4 Interpreting chemical/physical data to assess Domestic Water Supply Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Toxic substance** (e.g., radionuclides, priority pollutants, metals)	For any one pollutant, no exceedence of the criterion.	For any one pollutant, one or more exceedence of the criterion.	
•**Nitrate**	No exceedence of the criterion.	One or more exceedences of the criterion.	

3.3 Assessing Primary and Secondary Contact Use Support

Table 3.5 explains how to interpret bacteriological data to assess contact use support Refer to Paragraph B under the appropriate stream segment number and to Section 20.6.4.900.G of the Water Quality Standards for standards to determine use support for primary and secondary contact recreation.

Table 3.5 Interpreting bacteriological data to assess Contact Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Fecal coliform**			
A) 1 to 7 samples	**A**) No more than one exceedence of the single sample criterion.	**A**) More than one exceedence of the single sample criterion.	SWQB proposes replacing fecal coliform criteria with *E. coli* criteria during the next triennial review (proposed under 20.6.4.900).
B) > 7 samples	**B**) Single sample criterion is exceeded in <15% of samples and geometric mean criterion is met	**B**) Single sample criterion exceeded in ≥ 15% of measurements and/or geometric mean criterion is not met.	USEPA guidance recommends a 10% exceedence rate to determine impairment (USEPA 2002a). Because short holding times often lead to a small total number of samples, USEPA Region 6 believes a 25% exceedence rate is acceptable.

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3.4 Assessing Irrigation Use Support

Table 3.6 explains how to interpret chemical/physical and bacteriological data to assess irrigation use support Refer to Section 20.6.4.900.D and 20.6.4.900.M of the Water Quality Standards for the numeric standards for the protection of irrigation use.

Table 3.6 Interpreting chemical/physical and bacteriological data to assess Irrigation Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Toxic substance** (e.g., radionuclides, priority pollutants, metals)	For any one pollutant, no more than one exceedence of the criterion.	For any one pollutant, more than one exceedence of the criterion.	
•**Fecal coliform**			SWQB proposes replacing fecal coliform criteria with *E. coli* criteria during the next triennial review (proposed under 20.6.4.900).
A) 1 to 7 samples	**A**) No more than one exceedence of the single sample criterion.	**A**) More than one exceedence of the single sample criterion.	
B) > 7 samples	**B**) Single sample criterion is exceeded in <15% of samples and geometric mean criterion is met.	**B**) Single sample criterion exceeded in ≥ 15% of measurements and/or geometric mean criterion is not met.	USEPA guidance recommends a 10% exceedence rate to determine impairment (USEPA 2002a). Because short holding times often lead to a small total number of samples, USEPA Region 6 believes a 25% exceedence rate is acceptable.

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3.4 Assessing Livestock Watering Support

Table 3.7 explains how to interpret chemical/physical data to assess livestock watering use support Refer to Section 20.6.4.900.K and 20.6.4.900.M of the Water Quality Standards for the numeric standards for the protection of livestock watering.

Table 3.7 Interpreting chemical/physical data to assess Livestock Watering Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Toxic substance** (e.g., radionuclides, priority pollutants, metals)	For any one pollutant, no more than one exceedence of the criterion.	For any one pollutant, more than one exceedence of the criterion.	

3.5 Assessing Wildlife Habitat Use Support

Table 3.8 explains how to interpret chemical/physical data to assess wildlife habitat use support. Refer to Section 20.6.4.900.L of the Water Quality Standards for narrative criteria and 20.6.4.900.M for numeric standards for the protection of wildlife habitat use.

Table 3.8 Interpreting chemical/physical data to assess Wildlife Habitat Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Toxic substance** (e.g., PCBs, DDT, cyanide, chlorine, metals)	For any one pollutant, no more than one exceedence of the acute criterion, and no more than one exceedence of the chronic criterion or chronic screening level in three years.	For any one pollutant, more than one exceedence of the acute criterion, or more than one exceedence of the chronic criterion or chronic screening level in three years.	The **chronic criterion** shall be applied to the arithmetic mean of the analytical results of consecutive-day samples. Consecutive-day samples are often not available. When this is the case, the **chronic screening level** of 1.5 times the chronic criterion shall be first be calculated and then compared to individual grab sample result to determine whether an exceedence has occurred (see Section 2.1.6).

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3.6 Assessing Human Health Use Support

Table 3.9 explains how to interpret chemical/physical data to assess human health use support. Refer to Section 20.6.4.900.M of the Water Quality Standards for the numeric standards for protection of human health.

Table 3.9 Interpreting chemical/physical data to assess Human Health Use Support

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Toxic substance** (e.g., cyanide, PAHs, pesticides, PCBs, metals)	For any one pollutant, no more than one exceedence of the criterion.	For any one pollutant, more than one exceedence of the criterion.	

3.7 Assessing Non-Use Specific Criterion

Table 3.9 explains how to interpret chemical/physical data to assess segment-specific numeric criteria. Refer to Sections 20.6.4.101 through 20.6.4.805 of the Water Quality Standards for segment-specific numeric criterion not expressly related to any particular use.

Table 3.9 Interpreting chemical/physical data to assess segment-specific numeric criteria

TYPE OF DATA	FULLY SUPPORTING	NOT SUPPORTING	NOTES
•**Total dissolved solids, sulfate, chloride**			
A) 1 to 7 samples	**A**) For any one pollutant, no more than one exceedence of the criterion.	**A**) For any one pollutant, more than one exceedence of the criterion.	
B) > 7 samples	**B**) For any one pollutant, criterion exceeded in <15% of measurements.	**B**) For any one pollutant, criterion exceeded in ≥ 15% of measurements.	

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Appendix B
Basic Standards and Treatment of Water Column

20.6.4.900 STANDARDS APPLICABLE TO ATTAINABLE OR DESIGNATED USES UNLESS OTHERWISE SPECIFIED IN 20.6.4.101 THROUGH 20.6.4.899 NMAC.

A. Coldwater Fishery: Dissolved oxygen shall not be less than 6.0 mg/L, temperature shall not exceed 20°C (68°F), and pH shall be within the range of 6.6 to 8.8. The acute and chronic aquatic life standards set out in subsections J and M of this section are applicable to this use. The total ammonia standards set out in Subsection O of this section and the human health standards listed in Subsection M of this section are applicable to this use.

B. Domestic Water Supply: Surface waters of the state designated for use as domestic water supplies shall not contain substances in concentrations that create a lifetime cancer risk of more than one cancer per 100,000 exposed persons. The following numeric standards and those standards listed under domestic water supply in Subsection M of this section shall not be exceeded:

(1)	dissolved nitrate (as N)	10.	mg/L
(2)	radium-226 + radium-228	5.	pCi/L
(3)	strontium-90	8	pCi/L
(4)	tritium	20,000	pCi/L
(5)	gross alpha (including radium-266, but excluding radon and uranium)	15	pCi/L

C. High Quality Coldwater Fishery: Dissolved oxygen shall not be less than 6.0 mg/L, temperature shall not exceed 20°C (68°F), pH shall be within the range of 6.6 to 8.8, turbidity shall not exceed 10 NTU (25 NTU in certain reaches where natural background prevents attainment of lower turbidity), and conductivity (at 25°C) shall not exceed a limit varying between 300 mmhos/cm and 1,500 mmhos/cm depending on the natural background in particular surface waters of the state (the intent of this standard is to prevent excessive increases in dissolved solids which would result in changes in community structure). The acute and chronic aquatic life standards set out in subsections J and M of this section are applicable to this use. The total ammonia standards set out in Subsection O of this section and the human health standards for pollutants listed in Subsection M of this section are applicable to this use.

D. Irrigation and Irrigation Storage: The monthly geometric mean of fecal coliform bacteria shall not exceed 1,000/100 mL; no single sample shall exceed 2,000/100 mL. The following numeric standards and those standards listed under irrigation in Subsection M of this section shall not be exceeded:

(1)	dissolved selenium	0.13	mg/L
(2)	dissolved selenium in presence of >500 mg/L SO_4	0.25	mg/L

E. Limited Warmwater Fishery: Dissolved oxygen shall not be less than 5 mg/L, pH shall be within the range of 6.6 to 9.0, and on a case by case basis maximum temperatures may exceed 32.2°C. The acute and chronic aquatic life standards set out in subsections J and M of this section are applicable to this use. The total ammonia standards set out in Subsection N of this section and the human health standards listed in Subsection M of this section are applicable to this use.

F. Marginal Coldwater Fishery: Dissolved oxygen shall not be less than 6 mg/L, on a case by case basis maximum temperatures may exceed 25°C and the pH may range from 6.6 to 9.0. The acute and chronic aquatic life standards set out in subsections J and M of this section are applicable to this use. The total ammonia standards set out in Subsection O of this section and the human health standards listed in Subsection M of this section are applicable to this use.

G. Primary Contact: The monthly geometric mean of fecal coliform bacteria shall not exceed 200/100 mL, no single sample shall exceed 400/100 mL and pH shall be within the range of 6.6 to 9.0.

H. Warmwater Fishery: Dissolved oxygen shall not be less than 5 mg/L, temperature shall not exceed 32.2°C (90°F), and pH shall be within the range of 6.6 to 9.0. The acute and chronic standards set out in Subsection J of this section are applicable to this use. The total ammonia standards set out in Subsection M of this section are applicable to this use.

H. Warmwater Fishery: Dissolved oxygen shall not be less than 5 mg/L, temperature shall not exceed 32.2°C (90°F), and pH shall be within the range of 6.6 to 9.0. The acute and chronic aquatic life standards set out in subsections J and M of this section are applicable to this use. The total ammonia standards set out in Subsection N of this section and the human health standards listed in Subsection M of this section are applicable to this use.

I. Fish culture, secondary contact, and municipal and industrial water supply and storage are also designated in particular classified waters of the state where these uses are actually being realized. However, no numeric standards apply uniquely to these uses. Water quality adequate for these uses is ensured by the general standards and numeric standards for bacterial quality, pH, and temperature which are established for all classified waters of the state listed in 20.6.4.101 through 20.6.4.899 NMAC.

J. The following schedule of equations for the determination of numeric standards for the substances listed and those standards listed in Subsection M for aquatic life shall apply to the subcategories of fisheries identified in this section:

(1) Acute Standards

(a) dissolved silver $e^{(1.72[\ln(hardness)] - 6.6825)}$ ug/L

(b) dissolved cadmium $(e^{(1.128[\ln(hardness)] - 3.6867)})cf$ ug/L

The hardness-dependent fomulae for cadmium must be multiplied by a conversion factor (cf) to be expressed as dissolved values. The acute factor for cadmium is cf = 1.136672 - [(ln hardness)(0.041838)].

(c) dissolved chromium $e^{(0.819[\ln(hardness)] + 2.5736}$ ug/L

(d) dissolved copper $e^{(0.9422[\ln(hardness)] - 1.7408)}$ ug/L

(e) dissolved lead $(e^{(1.273[\ln(hardness)] - 1.46)})cf$ ug/L

The hardness-dependent fomulae for lead must be multiplied by a conversion factor (cf) to be expressed as dissolved values. The acute and chronic factor for lead is cf = 1.46203 - [(ln hardness)(0.145712)].

(f) dissolved nickel $e^{(0.8460[\ln(hardness)]+2.253)}$ ug/L

(g) dissolved zinc $e^{(0.8473[\ln(hardness)]+0.8618)}$ ug/L

(2) Chronic Standards

(a) dissolved cadmium $(e^{(0.7852[\ln(hardness)] - 2.715)})cf$ ug/L

The hardness-dependent formulae for cadmium must be multiplied by a conversion factor

(cf) to be expressed as dissolved values. The chronic factor for cadmium is cf = 1.101672 - [(ln hardness)(0.041838)].

(b) dissolved chromium $e^{(0.819[\ln(hardness)] + 0.534)}$ ug/L

(c) dissolved copper $e^{(0.8545[\ln(hardness)] - 1.7428)}$ ug/L

(d) dissolved lead $(e^{(1.273[\ln(hardness)] - 4.705)})cf$ ug/L

The hardness-dependent formulae for lead must be multiplied by a conversion factor (cf) to be expressed as dissolved values. The acute and chronic factor for lead is cf = 1.46203 - [(ln hardness)(0.145712)].

(e) dissolved nickel $e^{(0.846[\ln(hardness)] + 0.0554)}$ ug/L

(f) dissolved zinc $e^{(0.8473[\ln(hardness)]+0.8699)}$ ug/L

K. Livestock Watering: The following numeric standards and those standards listed in Subsection M for livestock watering shall not be exceeded:

(1) Radium-226 + radium-228 30.0 pCi/L

(2) Tritium 20,000 pCi/L

(3) Gross alpha 15 pCi/L

L. Wildlife Habitat: Wildlife habitat should be free from any substances at concentrations that are toxic to or will adversely affect plants and animals that use these environments for feeding, drinking, habitat or propagation, or can bioaccumulate and impair the community of animals in a watershed or the ecological integrity of surface waters of the state. In the absence of site-specific information, and subject to the following paragraph, the following chronic numeric standards listed in Subsection M for wildlife habitat shall not be exceeded. The discharge of substances which bioaccumulate, in excess of levels [specified above] listed in Subsection M for wildlife habitat is allowed if, and only to the extent that, the substances are present in the intake waters which are diverted and utilized prior to discharge, and then only if the discharger utilizes best available treatment technology to reduce the amount of bioaccumulating substances which are discharged.

M. Numeric criteria

The following table sets forth the numeric criteria adopted by the commission to protect existing, designated and attainable uses. Additional criteria that are not compatible with this table and are found in Subsections A through L of this section.

	Pollutant total, unless indicated	**CAS Number**	**Domestic Water Supply** µg/L	**Irrigation** µg/L	**Livestock Watering** µg/L	**Wildlife Habitat** µg/L	**Aquatic Life**		**Human Health** µg/L	**Cancer Causing and/or Persistent**
							Acute µg/L	**Chronic** µg/L		
1	Aluminum, dissolved	7429-90-5		5,000	5,000		750	87		
2	Antimony, dissolved	7440-36-0	6						4,300	P
3	Arsenic, dissolved	7440-38-2	50	100	200		340	150	24.2	C,P
4	Barium, dissolved	7440-39-3	2,000							
5	Beryllium, dissolved	7440-41-7	4				130	5.3		
6	Boron, dissolved	7440-42-8		750	5,000					
7	Cadmium, dissolved	7440-43-9	5	10	50		see 20.6.4.900.J	see 20.6.4.900.J		
8	Chlorine residual	7782-50-5				11	19	11		
9	Chromium, dissolved	18540-29-9	100	100	1,000		see 20.6.4.900.J	see 20.6.4.900.J		

	Pollutant total, unless indicated	CAS Number	Domestic Water Supply µg/L	Irrigation µg/L	Livestock Watering µg/L	Wildlife Habitat µg/L	Aquatic Life		Human Health µg/L	Cancer Causing and/or Persistent
							Acute µg/L	Chronic µg/L		
10	Cobalt, dissolved	7440-48-4		50	1,000					
11	Copper, dissolved	7440-50-8		200	500		see 20.6.4.900.J	see 20.6.4.900.J		
12	Cyanide, dissolved	57-12-5	200							
13	Cyanide, weak acid dissociable	57-12-5				5.2	22.0	5.2	220,000	
14	Lead, dissolved	7439-92-1	50	5,000	100		see 20.6.4.900.J	see 20.6.4.900.J		
15	Mercury	7439-97-6	2		10	0.77	2.4	0.012		
16	Molybdenum, dissolved	7439-98-7		1,000						
17	Nickel, dissolved	7440-02-0	100				see 20.6.4.900.J	see 20.6.4.900.J	4,600	P
18	Selenium, dissolved	7782-49-2	50	see 20.6.4.900.D	50				11,000	P
19	Selenium, total recoverable	7782-49-2				5.0	20.0	5.0		
20	Silver, dissolved	7440-22-4					see 20.6.4.900.J			
21	Thallium, dissolved	7440-28-0	2						6.3	P
22	Uranium, dissolved	7440-61-1	5,000							
23	Vanadium, dissolved	7440-62-2		100	100					
24	Zinc, dissolved	7440-66-6		2,000	25,000		see 20.6.4.900.J	see 20.6.4.900.J	69,000	P
25	Acenaphthene	83-32-9							2,700	
26	Acrolein	107-02-8							780	
27	Acrylonitrile	107-13-1							6.6	C
28	Aldrin	309-00-2					3.0		0.0014	C,P
29	Anthracene	120-12-7							110,000	
30	Benzene	71-43-2							710	C
31	Benzidine	92-87-5							0.0054	C
32	Benzo(a)anthracene	56-55-3							0.49	C
33	Benzo(a)pyrene	50-32-8							0.49	C,P
34	Benzo(b)fluoranthene	205-99-2							0.49	C
35	Benzo(k)fluoranthene	207-08-9							0.49	C
36	alpha-BHC	319-84-6							0.13	C
37	beta-BHC	319-85-7							0.46	C
38	Gamma-BHC (Lindane)	58-89-9					0.95		0.63	C
39	Bis(2-chloroethyl) ether	111-44-4							14	C
40	Bis(2-chloroisopropyl) ether	108-60-1							170,000	
41	Bis(2-ethylhexyl) phthalate	117817							59	C
42	Bromoform	75-25-2							3600	C
43	Butylbenzyl phthalate	85-68-7							5,200	
44	Carbon tetrachloride	56-23-5							44	C
45	Chlordane	57-74-9					2.4	0.0043	0.022	C,P
46	Chlorobenzene	108-90-7							21,000	

	Pollutant total, unless indicated	CAS Number	Domestic Water Supply µg/L	Irrigation µg/L	Livestock Watering µg/L	Wildlife Habitat µg/L	Aquatic Life Acute µg/L	Aquatic Life Chronic µg/L	Human Health µg/L	Cancer Causing and/or Persistent
47	Chlorodibromomethane	124-48-1							340	C
48	Chloroform	67-66-3							4,700	C
49	2-Chloronaphthalene	91-58-7							4,300	
50	2-Chlorophenol	95-57-8							400	
51	Chrysene	218-01-9							0.49	C
52	4,4'-DDT and derivatives	50-29-3				0.001	1.1	0.001	0.0059	C,P
53	Dibenzo(a,h)anthracene	53-70-3							0.49	C
54	Dibutyl phthalate	84-74-2							12,000	
55	1,2-Dichlorobenzene	95-50-1							17,000	
56	1,3-Dichlorobenzene	541-73-1							2,600	
57	1,4-Dichlorobenzene	106-46-7							2,600	
58	3,3'-Dichlorobenzidine	91-94-1							0.77	C
59	Dichlorobromomethane	75-27-4							460	C
60	1,2-Dichloroethane	107-06-2							990	C
61	1,1-Dichloroethylene	75-35-4							32	C
62	2,4-Dichlorophenol	120-83-2							790	
63	1,2-Dichloropropane	78-87-5							390	C
64	1,3-Dichloropropene	542-75-6							1,700	
65	Dieldrin	60-57-1					0.24	0.056	0.0014	C,P
66	Diethyl phthalate	84-66-2							120,000	
67	Dimethyl phthalate	131-11-3							2,900,000	
68	2,4-Dimethylphenol	105-67-9							2,300	
69	2,4-Dinitrophenol	51-28-5							14,000	
70	2,4-Dinitrotoluene	121-14-2							91	C
71	2,3,7,8-TCDD Dioxin	1746-01-6							1.4E-07	C,P
72	1,2-Diphenylhydrazine	122-66-7							5.4	C
73	alpha-Endosulfan	959-98-8					0.22	0.056	240	
74	beta-Endosulfan	33213-65-9					0.22	0.056	240	
75	Endosulfan sulfate	1031-07-8							240	
76	Endrin	72-20-8					0.086	0.036	0.81	
78	Endrin aldehyde	7421-93-4							0.81	
79	Ethylbenzene	100-41-4							29,000	
80	Fluoranthene	206-44-0							370	
81	Fluorene	86-73-7							14,000	
82	Heptachlor	76-44-8					0.52	0.0038	0.0021	C
83	Heptachlor epoxide	1024-57-3					0.52	0.0038	0.0011	C
84	Hexachlorobenzene	118-74-1							0.0077	C,P
85	Hexachlorobutadiene	87-68-3							500	C
86	Hexachlorocyclopentadiene	77-47-4							17,000	

	Pollutant total, unless indicated	CAS Number	Domestic Water Supply µg/L	Irrigation µg/L	Livestock Watering µg/L	Wildlife Habitat µg/L	Aquatic Life Acute µg/L	Aquatic Life Chronic µg/L	Human Health µg/L	Cancer Causing and/or Persistent
87	Hexachloroethane	67-72-1							89	C
88	Ideno(1,2,3-cd)pyrene	193-39-5							0.49	C
89	Isophorone	78-59-1							26,000	C
90	Methyl bromide	74-83-9							4000	
91	2-Methyl-4,6-dinitrophenol	534-52-1							765	
92	Methylene chloride	75-09-2							16,000	C
93	Nitrobenzene	98-95-3							1,900	
94	N-Nitrosodimethylamine	62-75-9							81	C
95	N-Nitrosodi-n-propylamine	621-64-7							14	C
96	N-Nitrosodiphenylamine	86-30-6							160	C
97	PCBs	1336-36-3				0.014		0.014	0.0017	C,P
98	Pentachlorophenol	87-86-5					19	15	82	C
99	Phenol	108-95-2							4,600,000	
100	Pyrene	129-00-0							11,000	
101	1,1,2,2-Tetrachloroethane	79-34-5							110	C
102	Tetrachloroethylene	127-18-4							88.5	C,P
103	Toluene	108-88-3							200,000	
104	Toxaphene	8001-35-2					0.73	0.0002	0.0075	C
105	1,2-Trans-dichloroethylene	156-60-5							140,000	
106	1,2,4-Trichlorobenzene	120-82-1							940	
107	1,1,2-Trichloroethane	79-00-5							420	C
108	Trichloroethylene	79-01-6							810	C
109	2,4,6-Trichlorophenol	88-06-2							65	C
110	Vinyl chloride	75-01-4							5,250	C

N. Total Ammonia (mg/L as N), Warmwater Fisheries:

(1) acute standards

	pH										
Temp. °C	**6.50**	**6.75**	**7.00**	**7.25**	**7.50**	**7.75**	**8.00**	**8.25**	**8.50**	**8.75**	**9.00**
0	29	26	23	19	14	10	6.6	3.7	2.1	1.2	0.70
1	28	26	23	19	14	9.9	6.5	3.7	2.1	1.2	0.70
2	28	26	22	18	14	9.7	6.4	3.6	2.1	1.2	0.69
3	28	25	22	18	14	9.6	6.3	3.6	2.0	1.2	0.69
4	27	25	22	18	14	9.5	6.2	3.5	2.0	1.2	0.69
5	27	25	22	18	13	9.4	6.1	3.5	2.0	1.2	0.68
6	27	24	21	18	13	9.3	6.1	3.5	2.0	1.1	0.68

7	26	24	21	17	13	9.2	6.0	3.4	2.0	1.1	0.68
8	26	24	21	17	13	9.1	6.0	3.4	1.9	1.1	0.68
9	26	24	21	17	13	9.0	5.9	3.4	1.9	1.1	0.68
10	25	23	21	17	13	8.9	5.9	3.3	1.9	1.1	0.68
11	25	23	20	17	13	8.9	5.8	3.3	1.9	1.1	0.68
12	25	23	20	17	13	8.8	5.8	3.3	1.9	1.1	0.69
13	25	23	20	16	12	8.7	5.7	3.3	1.9	1.1	0.69
14	25	23	20	16	12	8.7	5.7	3.3	1.9	1.1	0.70
15	24	23	20	16	12	8.6	5.7	3.3	1.9	1.1	0.70
16	24	22	20	16	12	8.6	5.7	3.3	1.9	1.1	0.71
17	24	22	20	16	12	8.5	5.6	3.2	1.9	1.1	0.72
18	24	22	19	16	12	8.5	5.6	3.2	1.9	1.2	0.73
19	24	22	19	16	12	8.5	5.6	3.2	1.9	1.2	0.74
20	24	22	19	16	12	8.5	5.6	3.2	1.9	1.2	0.75
21	24	22	19	16	12	8.4	5.6	3.2	1.9	1.2	0.77
22	24	22	19	16	12	8.4	5.6	3.3	1.9	1.2	0.78
23	24	22	19	16	12	8.4	5.6	3.3	1.9	1.2	0.80
24	24	22	19	16	12	8.4	5.6	3.3	2.0	1.2	0.81
25	24	22	19	16	12	8.4	5.6	3.3	2.0	1.2	0.83
26	22	20	18	15	11	7.9	5.2	3.1	1.9	1.2	0.80
27	20	19	17	14	10	7.3	4.9	2.9	1.8	1.1	0.76
28	19	18	15	13	9.7	6.9	4.6	2.7	1.7	1.1	0.73
29	18	16	14	12	9.1	6.4	4.3	2.6	1.6	1.0	0.70
30	17	15	13	11	8.5	6.0	4.1	2.4	1.5	0.97	0.68

(2) chronic standards

					pH						
Temp. C	**6.50**	**6.75**	**7.00**	**7.25**	**7.50**	**7.75**	**8.00**	**8.25**	**8.50**	**8.75**	**9.00**
0	2.5	2.5	2.5	2.5	2.5	2.3	1.5	0.84	0.48	0.28	0.16
1	2.5	2.5	2.5	2.5	2.5	2.3	1.5	0.8	0.47	0.27	0.16
2	2.4	2.4	2.4	2.4	2.4	2.2	1.5	0.82	0.47	0.27	0.16
3	2.4	2.4	2.4	2.4	2.4	2.2	1.4	0.81	0.46	0.27	0.16
4	2.4	2.4	2.4	2.4	2.4	2.2	1.4	0.80	0.46	0.27	0.16
5	2.3	2.3	2.3	2.3	2.3	2.1	1.4	0.80	0.45	0.26	0.16
6	2.3	2.3	2.3	2.3	2.3	2.1	1.4	0.79	0.45	0.26	0.16
7	2.3	2.3	2.3	2.3	2.3	2.1	1.4	0.78	0.45	0.26	0.16
8	2.3	2.3	2.3	2.3	2.3	2.1	1.4	0.77	0.44	0.26	0.15
9	2.2	2.2	2.2	2.2	2.2	2.1	1.3	0.77	0.44	0.26	0.16
10	2.2	2.2	2.2	2.2	2.2	2.0	1.3	0.76	0.44	0.26	0.16

11	2.2	2.2	2.2	2.2	2.2	2.0	1.3	0.76	0.44	0.26	0.16
12	2.2	2.2	2.2	2.2	2.2	2.0	1.3	0.75	0.44	0.26	0.16
13	2.2	2.2	2.2	2.2	2.2	2.0	1.3	0.75	0.43	0.26	0.16
14	2.1	2.1	2.1	2.1	2.2	2.0	1.3	0.75	0.43	0.26	0.16
15	2.1	2.1	2.1	2.1	2.1	2.0	1.3	0.74	0.43	0.26	0.16
16	2.1	2.1	2.1	2.1	2.1	2.0	1.3	0.74	0.43	0.26	0.16
17	2.1	2.1	2.1	2.1	2.1	1.9	1.3	0.74	0.43	0.26	0.16
18	2.1	2.1	2.1	2.1	2.1	1.9	1.3	0.74	0.43	0.26	0.17
19	2.1	2.1	2.1	2.1	2.1	1.9	1.3	0.74	0.44	0.26	0.17
20	2.1	2.1	2.1	2.1	2.1	1.9	1.3	0.74	0.44	0.27	0.17
21	1.9	1.9	1.9	1.9	1.9	1.8	1.2	0.69	0.41	0.25	0.16
22	1.8	1.8	1.8	1.8	1.8	1.7	1.1	0.65	0.38	0.24	0.15
23	1.7	1.7	1.7	1.7	1.7	1.6	1.0	0.60	0.36	0.22	0.15
24	1.6	1.6	1.6	1.6	1.6	1.5	0.97	0.57	0.34	0.21	0.14
25	1.4	1.4	1.5	1.5	1.5	1.4	0.91	0.53	0.32	0.20	0.13
26	1.3	1.3	1.4	1.4	1.4	1.3	0.85	0.50	0.30	0.19	0.13
27	1.3	1.3	1.3	1.3	1.3	1.2	0.79	0.47	0.28	0.18	0.12
28	1.2	1.2	1.2	1.2	1.2	1.1	0.74	0.44	0.27	0.17	0.12
29	1.1	1.1	1.1	1.1	1.1	1.0	0.70	0.41	0.25	0.16	0.11
30	1.0	1.0	1.0	1.0	1.0	0.97	0.65	0.39	0.24	0.16	0.11

O. Total Ammonia (mg/l as N), Coldwater Fisheries:

(1) acute standards

					pH						
Temp. C	**6.50**	**6.75**	**7.00**	**7.25**	**7.50**	**7.75**	**8.00**	**8.25**	**8.50**	**8.75**	**9.00**
0	29	26	23	19	14	10	6.6	3.7	2.1	1.2	0.70
1	28	26	23	19	14	9.9	6.5	3.7	2.1	1.2	0.70
2	28	26	22	18	14	9.7	6.4	3.6	2.1	1.2	0.69
3	28	25	22	18	14	9.6	6.3	3.6	2.0	1.2	0.69
4	27	25	22	18	14	9.5	6.2	3.5	2.0	1.2	0.69
5	27	25	22	18	13	9.4	6.1	3.5	2.0	1.2	0.68
6	27	24	2	18	13	9.3	6.1	3.5	2.0	1.1	0.68
7	26	24	21	17	13	9.2	6.0	3.4	2.0	1.1	0.68
8	26	24	21	17	13	9.1	6.0	3.4	1.9	1.1	0.68
9	26	24	21	17	13	9.0	5.9	3.4	1.9	1.1	0.68
10	25	23	21	17	13	8.9	5.9	3.3	1.9	1.1	0.68
11	25	23	20	17	13	8.9	5.8	3.3	1.9	1.1	0.68
12	25	23	20	17	13	8.8	5.8	3.3	1.9	1.1	0.69
13	25	23	20	16	12	8.7	5.7	3.3	1.9	1.1	0.69

14	25	23	20	16	12	8.7	5.7	3.3	1.9	1.1	0.70
15	24	23	20	16	12	8.6	5.7	3.3	1.9	1.1	0.70
16	24	22	20	16	12	8.6	5.7	3.3	1.9	1.1	0.71
17	24	22	20	16	12	8.5	5.6	3.2	1.9	1.1	0.72
18	24	22	19	16	12	8.5	5.6	3.2	1.9	1.2	0.73
19	24	22	19	16	12	8.5	5.6	3.2	1.9	1.2	0.74
20	24	22	19	16	12	8.5	5.6	3.2	1.9	1.2	0.75
21	22	20	18	15	11	7.9	5.2	3.0	1.8	1.1	0.71
22	21	19	17	14	10	7.3	4.9	2.8	1.7	1.0	0.68
23	19	18	15	13	9.7	6.8	4.5	2.7	1.6	0.98	0.65
24	18	16	14	12	9.0	6.4	4.2	2.5	1.5	0.93	0.62
25	17	15	13	11	8.4	6.0	4.0	2.3	1.4	0.88	0.59
26	16	14	13	10	7.9	5.6	3.7	2.2	1.3	0.84	0.56
27	14	13	12	9.6	7.3	5.2	3.5	2.1	1.2	0.79	0.54
28	13	12	11	9.0	6.9	4.9	3.3	1.9	1.2	0.76	0.52
29	13	12	10	8.4	6.4	4.6	3.1	1.8	1.1	0.72	0.50
30	12	1	10	7.8	6.0	4.3	2.9	1.7	1.1	0.69	0.48

(2) chronic standards

					pH						
Temp. C	**6.50**	**6.75**	**7.00**	**7.25**	**7.50**	**7.75**	**8.00**	**8.25**	**8.50**	**8.75**	**9.00**
0	2.5	2.5	2.5	2.5	2.5	2.3	1.5	0.84	0.48	0.28	0.16
1	2.5	2.5	2.5	2.5	2.5	2.3	1.5	0.83	0.47	0.27	0.16
2	2.4	2.4	2.4	2.4	2.4	2.2	1.5	0.82	0.47	0.27	0.16
3	2.4	2.4	2.4	2.4	2.4	2.2	1.4	0.81	0.46	0.27	0.16
4	2.4	2.4	2.4	2.4	2.4	2.2	1.4	0.80	0.46	0.27	0.16
5	2.3	2.3	2.3	2.3	2.3	2.1	1.4	0.80	0.45	0.26	0.16
6	2.3	2.3	2.3	2.3	2.3	2.1	1.4	0.79	0.45	0.26	0.16
7	2.3	2.3	2.3	2.3	2.3	2.1	1.4	0.78	0.45	0.26	0.16
8	2.3	2.3	2.3	2.3	2.3	2.1	1.4	0.77	0.44	0.26	0.15
9	2.2	2.2	2.2	2.2	2.2	2.1	1.3	0.77	0.44	0.26	0.16
10	2.2	2.2	2.2	2.2	2.2	2.0	1.3	0.76	0.44	0.26	0.16
11	2.2	2.2	2.2	2.2	2.2	2.0	1.3	0.76	0.44	0.26	0.16
12	2.2	2.2	2.2	2.2	2.2	2.0	1.3	0.75	0.44	0.26	0.16
13	2.2	2.2	2.2	2.2	2.2	2.0	1.3	0.75	0.43	0.26	0.16
14	2.1	2.1	2.1	2.1	2.2	2.0	1.3	0.75	0.43	0.26	0.16
15	2.1	2.1	2.1	2.1	2.1	2.0	1.3	0.74	0.43	0.26	0.16
16	2.0	2.0	2.0	2.0	2.0	1.8	1.2	0.69	0.40	0.24	0.15
17	1.8	1.8	1.8	1.8	1.8	1.7	1.1	0.64	0.38	0.23	0.14

18	1.7	1.7	1.7	1.7	1.7	1.6	1.0	0.60	0.35	0.21	0.14
19	1.6	1.6	1.6	1.6	1.6	1.5	0.97	0.56	0.33	0.20	0.13
20	1.5	1.5	1.5	1.5	1.5	1.4	0.90	0.52	0.31	0.19	0.12
21	1.4	1.4	1.4	1.4	1.4	1.3	0.84	0.49	0.29	0.18	0.12
22	1.3	1.3	1.3	1.3	1.3	1.2	0.79	0.46	0.27	0.17	0.11
23	1.2	1.2	1.2	1.2	1.2	1.1	0.73	0.43	0.26	0.16	0.10
24	1.1	1.1	1.1	1.1	1.1	1.0	0.69	0.40	0.24	0.15	0.10
25	1.0	1.0	1.0	1.0	1.0	0.96	0.64	0.38	0.23	0.14	0.095
26	0.95	0.95	0.96	0.96	0.97	0.9	0.60	0.35	0.21	0.13	0.091
27	0.89	0.89	0.89	0.90	0.91	0.84	0.56	0.33	0.20	0.13	0.087
28	0.83	0.83	0.83	0.84	0.85	0.79	0.53	0.31	0.19	0.12	0.084
29	0.77	0.78	0.78	0.78	0.79	0.73	0.49	0.29	0.18	0.12	0.080
30	0.72	0.72	0.73	0.73	0.74	0.69	0.46	0.28	0.17	0.11	0.077

P. Dissolved oxygen saturation based on temperature and elevation.

Elevation (feet)

	0	**500**	**1,000**	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	**4,000**	**4,500**	**5,000**	**5,500**	**6,000**	**6,500**	**7,000**	**7,500**	**8,000**	**8,500**	**9.000**	**9,500**	**10,000**
ºC																					
0	14.6	14.3	14.1	13.8	13.6	13.3	13.1	12.8	12.6	12.3	12.1	11.9	11.6	11.4	11.2	11.0	10.8	10.6	10.3	10.1	9.9
1	14.2	13.9	13.7	13.4	13.2	12.9	12.7	12.5	12.2	12.0	11.8	11.5	11.3	11.1	10.9	10.7	10.5	10.3	10.1	9.9	9.7
2	13.8	13.6	13.3	13.1	12.8	12.6	12.4	12.1	11.9	11.7	11.5	11.2	11.0	10.8	10.6	10.4	10.2	10.0	9.8	9.6	9.4
3	13.4	13.2	13.0	12.7	12.5	12.3	12.0	11.8	11.6	11.4	11.1	10.9	10.7	10.5	10.3	10.1	9.9	9.7	9.5	9.3	9.1
4	13.1	12.8	12.6	12.4	12.2	11.9	11.7	11.5	11.3	11.1	10.9	10.7	10.4	10.2	10.0	9.8	9.7	9.5	9.3	9.1	8.9
5	12.7	12.5	12.3	12.1	11.8	11.6	11.4	11.2	11.0	10.8	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.2	9.0	8.9	8.7
6	12.4	12.2	12.0	11.8	11.5	11.3	11.1	10.9	10.7	10.5	10.3	10.1	9.9	9.7	9.5	9.4	9.2	9.0	8.8	8.6	8.5
7	12.1	11.9	11.7	11.5	11.3	11.1	10.8	10.6	10.4	10.2	10.1	9.9	9.7	9.5	9.3	9.1	8.9	8.8	8.6	8.4	8.2
8	11.8	11.6	11.4	11.2	11.0	10.8	10.6	10.4	10.2	10.0	9.8	9.6	9.4	9.3	9.1	8.9	8.7	8.6	8.4	8.2	8.0
9	11.5	11.3	11.1	10.9	10.7	10.5	10.3	10.1	9.9	9.8	9.6	9.4	9.2	9.0	8.9	8.7	8.5	8.3	8.2	8.0	7.8
10	11.3	11.1	10.9	10.7	10.5	10.3	10.1	9.9	9.7	9.5	9.4	9.2	9.0	8.8	8.7	8.5	8.3	8.1	8.0	7.8	7.7
11	11.0	10.8	10.6	10.4	10.2	10.0	9.9	9.7	9.5	9.3	9.1	9.0	8.8	8.6	8.5	8.3	8.1	8.0	7.8	7.6	7.5
12	10.8	10.6	10.4	10.2	10.0	9.8	9.6	9.5	9.3	9.1	8.9	8.8	8.6	8.4	8.3	8.1	7.9	7.8	7.6	7.5	7.3
13	10.5	10.3	10.1	9.9	9.8	9.6	9.4	9.2	9.1	8.9	8.7	8.6	8.4	8.2	8.1	7.9	7.8	7.6	7.2	7.3	7.2
14	10.3	10.1	9.9	9.7	9.6	9.4	9.2	9.0	8.9	8.7	8.5	8.4	8.2	8.1	7.9	7.7	7.6	7.1	7.3	7.1	7.0
15	10.1	9.9	9.7	9.2	9.3	9.2	9.0	8.8	8.7	8.2	8.4	8.2	8.0	7.9	7.7	7.6	7.4	7.3	7.1	7.0	6.8
16	9.8	9.7	9.2	9.3	9.2	9.0	8.8	8.7	8.2	8.3	8.2	8.0	7.9	7.7	7.6	7.1	7.3	7.1	7.0	6.8	6.7
17	9.6	9.5	9.3	9.1	9.0	8.8	8.6	8.2	8.3	8.2	8.0	7.9	7.7	7.6	7.4	7.3	7.1	7.0	6.8	6.7	6.6
18	9.4	9.3	9.1	8.9	8.8	8.6	8.5	8.3	8.1	8.0	7.8	7.7	7.5	7.4	7.3	7.1	7.0	6.8	6.7	6.6	6.4
19	9.3	9.1	8.9	8.8	8.6	8.4	8.3	8.1	8.0	7.8	7.7	7.2	7.1	7.2	7.1	7.0	6.8	6.7	6.6	6.4	6.3
20	9.1	8.9	8.7	8.6	8.4	8.3	8.1	8.0	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.8	6.7	6.6	6.4	6.3	6.2
21	8.9	8.7	8.6	8.4	8.3	8.1	8.0	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.8	6.7	6.6	6.4	6.3	6.2	6.0
22	8.7	8.6	8.4	8.2	8.1	8.0	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.8	6.7	6.6	6.4	6.3	6.2	6.1	5.9
23	8.6	8.4	8.2	8.1	7.9	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.8	6.7	6.6	6.4	6.3	6.2	6.1	5.9	5.8
24	8.4	8.2	8.1	7.9	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.8	6.7	6.6	6.4	6.3	6.2	6.1	5.9	5.8	5.7
25	8.2	8.1	7.9	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.8	6.7	6.6	6.5	6.3	6.2	6.1	6.0	5.8	5.7	5.6
26	8.1	7.9	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.8	6.7	6.6	6.5	6.3	6.2	6.1	6.0	5.8	5.7	5.6	5.5

27	7.9	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.8	6.7	6.6	6.5	6.3	6.2	6.1	6.0	5.9	5.7	5.6	5.5	5.4
28	7.8	7.7	7.5	7.4	7.2	7.1	7.0	6.9	6.7	6.6	6.5	6.4	6.2	6.1	6.0	5.9	5.8	5.6	5.5	5.4	5.3
29	7.7	7.5	7.4	7.3	7.1	7.0	6.9	6.7	6.6	6.5	6.4	6.2	6.1	6.0	5.9	5.8	5.7	5.5	5.4	5.3	5.2
30	7.5	7.4	7.3	7.1	7.0	6.9	6.7	6.6	6.5	6.4	6.3	6.1	6.0	5.9	5.8	5.7	5.6	5.4	5.3	5.2	5.1

[20.6.4.900 NMAC - Rp 20 NMAC 6.1.3100, 10-12-00; A, 10-11-02]

C?????

Appendix C
Stream and Waterbody Segmentation / Classification

2002 New Mexico Surface Water Assessment

HUC: 11040001 Cimarron Headwaters

Carrizozo Creek (Dry Cimmaron to headwaters)

Cimarron Headwaters

Assessment Unit:	Size (mi or ac):	WQS reference:	NPDES:	Priority:
NM-2701_40	44.79	20.6.4.701	0	4

Designated uses:	*Attainment status:
coldwater fishery	Not supporting
wildlife habitat	Fully supporting
secondary contact	Fully supporting
livestock watering	Fully supporting
irrigation	Fully supporting

*Attainment status is verified for sampled parameters only.

Assessment information: Assessment category: M

Probable Causes of Impairment:	Magnitude:
Temperature	Moderate
Dissolved oxygen	Moderate
Chloride	Moderate
Aluminum - chronic	Moderate

Probable Sources of Impairment:	Magnitude:
Range grazing - Riparian and/or Upland	Moderate
Natural Sources	Moderate
Hydromodification	Moderate
Grazing related Sources	Moderate
Agriculture	Moderate

Dry Cimarron River (Oak Creek to headwaters)

Cimarron Headwaters

Assessment Unit:	Size (mi or ac):	WQS reference:	NPDES:	Priority:
NM-2701_01	15.16	20.6.4.701	0	

Designated uses:	*Attainment status:
irrigation	Fully supporting
livestock watering	Fully supporting
secondary contact	Fully supporting
coldwater fishery	Fully supporting
wildlife habitat	Fully supporting

*Attainment status is verified for sampled parameters only.

Assessment information: Assessment category: M

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20.6.4.101 RIO GRANDE BASIN - The main stem of the Rio Grande from the international boundary and water commission sampling station above American dam upstream to one mile below Percha dam. (Sustained flow in the Rio Grande below Caballo reservoir is dependent on release from Caballo reservoir during the irrigation season; at other times of the year, there may be little or no flow.)

A. Designated Uses: irrigation, limited warmwater fishery, livestock watering, wildlife habitat, and secondary contact.

B. Standards:

(1) In any single sample: pH shall be within the range of 6.6 to 9.0, and temperature shall not exceed 34°C (93.2°F). The use-specific numeric standards set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed 200/100 mL; no single sample shall exceed 400/100 mL (see Subsection B of 20.6.4.13 NMAC).

(3) At mean monthly flows above 350 cfs, the monthly average concentration for: TDS shall not exceed 2,000 mg/L, sulfate shall not exceed 500 mg/L, and chlorides shall not exceed 400 mg/L. [20.6.4.101 NMAC – Rp 20 NMAC 6.1.2101, 10-12-00; A, 12-15-01]

20.6.4.102 RIO GRANDE BASIN - The main stem of the Rio Grande from one mile below Percha dam upstream to the headwaters of Caballo reservoir including Caballo reservoir. (Sustained flow in the Rio Grande below Caballo reservoir is dependent on release from Caballo reservoir during the irrigation season; at other times of the year, there may be little or no flow.)

A. Designated Uses: irrigation, livestock watering, wildlife habitat, primary contact, and warmwater fishery.

B. Standards:

(1) At any sampling site: pH shall be within the range of 6.6 to 9.0, temperature shall not exceed 32.2°C (90°F), and turbidity shall not exceed 50 NTU. The use-specific numeric standards set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed 100/100 mL; no single sample shall exceed 200/100 mL (see Subsection B of 20.6.4.13 NMAC). [20.6.4.102 NMAC – Rp 20 NMAC 6.1.2102, 10-12-00]

20.6.4.103 RIO GRANDE BASIN - The main stem of the Rio Grande from the headwaters of Caballo lake upstream to Elephant Butte dam and perennial reaches of tributaries to the Rio Grande in Sierra and Socorro counties. (Flow in this reach of the Rio Grande main stem is dependent upon release from Elephant Butte dam.)

A. Designated Uses: fish culture, irrigation, livestock watering, wildlife habitat, marginal coldwater fishery, secondary contact, and warmwater fishery.

B. Standards:

(1) In any single sample: pH shall be within the range of 6.6 to 9.0, and temperature shall not exceed 25°C (77°F). The use-specific numeric standards set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed l,000/100 mL; no single sample shall exceed 2,000/100 mL (see Subsection B of 20.6.4.13 NMAC). [20.6.4.103 NMAC – Rp 20 NMAC 6.1.2103, 10-12-00]

20.6.4.104 RIO GRANDE BASIN - Elephant Butte reservoir.

A. Designated Uses: irrigation storage, livestock watering, wildlife habitat, primary contact, and warmwater fishery.

B. Standards:

(1) At any sampling site: pH shall be within the range of 6.6 to 9.0, temperature shall not exceed 32.2°C (90°F), and turbidity shall not exceed 50 NTU. The use-specific numeric standards set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed 100/100 mL; no single sample shall exceed 200/100 mL (see Subsection B of 20.6.4.13 NMAC). [20.6.4.104 NMAC – Rp 20 NMAC 6.1.2104, 10-12-00]

Appendix D
Treatment of Sediment

P R O T O C O L

FOR THE ASSESSMENT OF STREAM BOTTOM DEPOSITS ON WADABLE STREAMS

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~ Revised ~
September 24, 2002

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Introduction

Clean stream bottom substrates are essential for optimum habitat for many fish and aquatic insect communities. The most obvious forms of degradation occur when critical habitat components, such as spawning gravels (Chapman and McLeod, 1987) and cobble surfaces, are physically covered by fines thereby decreasing intergravel oxygen and reducing or eliminating the quality and quantity of habitat for fish, macro invertebrates, and algae (Lisle, 1989; Waters, 1995). Chapman and Mcleod (1987) found that bed material size is related to habitat suitability for fish and macroinvertebrates and that excess sediment decreased both density and diversity of aquatic insects. Specific aspects of sediment-invertebrate relationships may be described as follows: 1) invertebrate abundance is correlated with substrate particle size; 2) fine sediment reduces the abundance of original populations by reducing interstitial habitat normally available in large-particle substrate (gravel, cobbles); and 3) species type, species richness, and diversity all change as substrate particle size changes from large (gravel, cobbles) to small (sand, silt, clay) (Waters, 1995).

In addition, sediment loads that exceed a stream's sediment transport capacity often trigger changes in stream morphology (Leopold and Wolman, 1964). Streams that become overwhelmed with sediment often go through a period of accelerated channel widening and streambank erosion before returning to a stable form (Rosgen, 1996). These morphological changes tend to accelerate erosion, thereby reducing habitat diversity (pools, riffles, etc.) and placing additional stress on the designated water use.

This protocol was developed to support an interpretation of the New Mexico State Water Quality Standards (NMWQCC, 2000) narrative standard for stream bottom deposits. The current standard for the deposition of material on the bottom of a stream channel is listed in the *State Of New Mexico Standards for Interstate and Intrastate Surface Waters*, Section 1105.A General Standards:

> Bottom Deposits: Surface waters of the State shall be free of water contaminants from other than natural causes that will settle and damage or impair the normal growth, function, or reproduction of aquatic life or significantly alter the physical or chemical properties of the bottom.

The following protocol is similar to the approach proposed by the State of Colorado (CDPH&E, 1998) and represents a simple, but quantitative, three-step assessment procedure for determining whether the above narrative standard is being attained in a particular stream reach or segment by: 1) comparing changes or differences, if any, between the site of concern and a reference site; 2) directly evaluating instream habitat by measuring either of two stream bottom substrate parameters or indicators, namely substrate size (mainly fines, 2 mm or less) abundance or cobble embeddedness, and; 3) verifying or confirming results obtained in number 2 by assessing and comparing benthic macroinvertebrate communities (or fish) at the same sites. **This protocol is not designed to determine sources, locations, quantities, or causes of excess stream bottom sediment**.

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1. Reference and Study Site

In order to properly assess a study site or stream reach for impairment(s) due to stream bottom deposits, a proper reference site must be selected and classified for comparison. Once this is accomplished, selected "indicators" such as percent fines, embeddedness, and biological integrity can be measured and compared between the two sites. Under this protocol, the reference site or condition serves as a quantitative and/or qualitative control or yardstick to which a study (or impacted site) may be statistically compared and evaluated. Reference conditions are used to scale the assessment to the "best attainable" situation. This approach is critical to the assessment because stream characteristics vary dramatically across different regions (Barbour *et al.*, 1996), watersheds, or even stream segments. **The ratio between the score for the study site and the reference site (or condition) provides a percent comparability measure for each station**. The station of interest is then classified on the basis of its similarity to expected conditions (reference condition) and its apparent potential to support an acceptable level of biological health (Barbour *et al.*, 1999).

Ideally, the reference and study sites should share similar or common characteristics such as elevation, geology, hydrology, hydraulics, watershed size, in-stream habitat (pools, substrate, etc), and riparian vegetation. However, if the study site is impaired, such things as channel hydraulics, habitat, and streamside vegetation may be different from the reference site simply because the differences observed may either be a cause or a result of a possible departure from the reference condition. Characteristics that cannot change over time should be used as primary attributes of similarity between reference and study sites. Examples of similar attributes are elevation, geology, and hydrology (precipitation, etc.). These three characteristics of similarity between a reference and study site can be ensured through the use of ecoregion designations. Simply put, **the study site and the reference site need to be in the same ecoregion**. Currently, the Surface Water Quality Bureau recognizes and/or uses two different ecoregion classifications. The first is a terrestrial system (Omernik, 1987) developed for the United States Environmental Protection Agency (USEPA) while the second is an evolving aquatic classification scheme based primarily on altitude and developed exclusively for New Mexico by its Department of Game and Fish (NMDGF) (Cowley *et al.*, 1997). To ensure that enough similarity exists between a reference and study site so that a valid comparison can be made, both sites should be in the same terrestrial and aquatic ecoregion. For example, sampling site A could be used as a reference for study site B if both sites are located in Omernik ecoregion 21 and NMDGF ecoregion 1. If, however, only one ecoregion classification scheme can be matched between the reference and study site, it should be the aquatic ecoregion classification. For instance, if sites A and B are in NMDG&F ecoregion 1, but site A is located in Omerick ecoregion 21 while site B is in ecoregion 22, the two sites can still be compared.

Additional or secondary characteristics that can be used to supplement and further fine tune the ecoregion similarity between reference and study sites are those that can be readily measured at each site such as stream type (Rosgen, 1996) and channel cross-sectional area. In other words, reference and study sites in the same ecoregion, having the same stream type (McGarrell, 1998) and cross-sectional area are extremely similar and can be readily compared. Use of these secondary characteristics in evaluating similarities for pairing of sampling sites needs further study. However, their use as an additional tool for evaluation of sites is encouraged (Barbour et al, 1999). At a minimum, these data can be entered into a database that can later be used in a statistical analysis to determine whether use of these characteristics is valid in site selection protocols.

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It should be pointed out that relative quality of every reference site is not equal based on location in a watershed. A tiered approach (CDPH&E, 1998) to establishing the reference condition is based on the quality of reference sites, and is consistent with USEPA technical guidance (Barbour *et al.*, 1996).

Tier 1. Reference sites are acceptable and are minimally disturbed or "natural" and described by EPA as the "biological integrity expectation." The following characteristics should be considered in selecting this group of reference sites: a) no upstream impoundments or diversions; b) no point discharges, spills, or hazardous waste sites; c) low human, agricultural, and road density, and; d) minimal nonpoint source impacts. An example would be a headwater mountain stream.

Tier 2. Reference sites are acceptable, but are more than minimally disturbed. Where no "natural" site or condition exists, the best available sites are sampled for determination of reference condition or selected based on best professional judgment for the best available site in the ecoregion. USEPA describes these sites as the "interim expectation" because of the potential for restoration to a minimally disturbed or "natural" condition listed in Tier 1.

Tier 3. Reference sites are not acceptable or no reference site exists. Reference conditions would be based on models, historical data, data from neighboring states, ecological information, and/or expert opinion as appropriate.

In summary, the classification of streams based on geographic region (ecoregions) and stream type (Rosgen 1994, 1996) is to reduce the complexity of biological information and improve the resolution or sensitivity of biological surveys by partitioning or accounting for variation between sites. Furthermore, the best classification variables are those that are readily obtained from maps or regional water characteristics such as ecoregion, gradient, alkalinity, and hardness. Stream characteristics that are readily affected by human activities or occur as a biological response to physical conditions (i.e., land use, habitat condition, or nutrient concentrations) should not be used as classification variables (McGarrell, 1998; Barbour *et al;* 1999).

2. <u>Physical Assessment</u>

In order to assess the stream bottom for contaminants (mainly sediment) that may damage or impair aquatic life and significantly alter the physical properties of the bottom, physical measurements of the stream bottom substrate must be made alongside measurements being made of the biological component. Physical measurements (or indicators) of the stream bottom need to take into account those attributes or characteristics that potentially promote the best physical habitat or environment for aquatic life independent of water quality. This concept can best be seen in Figure 1 (Plafkin *et al.,* 1989), which shows the relationship between habitat and biological quality. More specifically, substrate that is plentiful, sufficiently large and varied, and is not surrounded or buried by fines appears to offer the best attributes for habitat suitability for many aquatic organisms adapted to such conditions.

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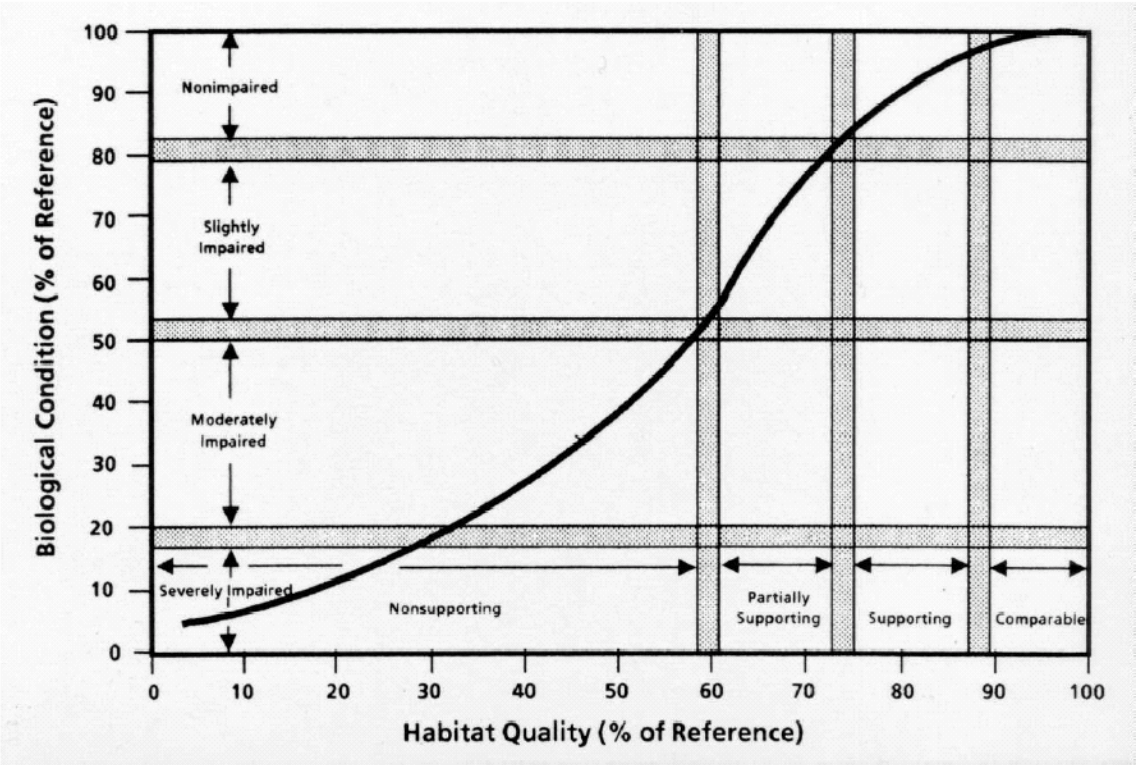

Figure 1. The relationship between habitat and biological condition (Plafkin *et al.*, 1989).

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In a study of 562 streams located in four northwestern states, Relyea *et al*. (2000) suggested **that changes to invertebrate communities as a result of fine sediment (2mm or less) occur between 20-35% fines**. Chapman and McLeod (1987) suggest that geometric particle size and percent of the bed surface covered by fines should both be used to define habitat quality. These two criteria can be ascertained by performing a **pebble count**. The pebble count procedure provides not only particle size distributions (D50, D84, etc.) and percent class sizes (% sand, % cobble, etc.), but offers a relatively fast and statistically reliable method for obtaining this information. In addition, relatively rapid temporal and spatial comparisons can be made at a number of sites within a watershed.

Although sufficient and varied sizes of stream bottom substrate are necessary for biological colonization, protection, and reproduction, its full potential may not be realized if the substrate surfaces are surrounded by fine sediment. In streams with a large amount of sediment, the coarser particles become surrounded or partially buried by fine sediment. **Embeddedness** quantitatively measures the extent to which larger particles are surrounded or buried by fine sediment (Mc Donald *et al*., 1991). Studies by Bjorn *et al*. (1974, 1977) concluded **that approximately one-third embeddedness (33%) or less is probably the normal condition in proper functioning streams**. Above this condition, however, insect populations decline substantially as habitat spaces become smaller and filled. By performing a **pebble count** and/or measuring **cobble embeddedness**, the stream bottom can be characterized as an aquatic habitat, compared to a reference site, and then tentatively evaluated for impairment due to stream bottom deposits. **Confirmation** of impairment takes place when a stream site is **biologically assessed**.

A. Pebble Count

The pebble count (Wolman, 1954) may be performed separately or as part of a larger stream inventory and assessment study (Rosgen, 1996). **It is recommended that biological sampling and pebble counts be performed concurrently**. The intermediate axis of particles should be measured **within the wetted perimeter of the channel** and tallied using standard Wentworth size classes (Bunte and Abt, 2001) from 10 equidistant transects (10 particles/transect as a minimum) selected along a longitudinal stream section of the **specific habitat type** being biologically sampled (riffle, run, pool) or evaluated. Pebble counts may be recorded, tallied, and represented either by using forms provided by Rosgen in the *Reference Reach* field book (Rosgen, 1998) or on a computer laptop at streamside using the *Reference Reach* (channel materials) software package (Mecklenberg, 1998) which can be downloaded from the State of Ohio Department of Natural Resources website (www.dnr.state.oh.us/odnr/soil+water/streammorphology.htm).

From the raw data, D35, D50, and D84 values can then be calculated along with percent composition values for six classes of channel materials ranging from fines (silt, clay, and sand) to bedrock. If a "Rosgen" Level II classification is being performed in addition to the sediment protocol assessment, a separate pebble count analysis should be done to account for the larger bankfull widths, increased longitudinal distances, and multiple habitats used in various "Rosgen" protocols.

In order to ascertain and/or evaluate increases in fines by pebble count methodology and its potential effect on aquatic life at the study (or impacted) site relative to the reference site, the

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following steps should be taken. First, download a copy of the pebble count software tool *Size-Class Pebble Count Analyzer V1 2001.xls* (651KB) by John Potyondi and Kristin Bunte from the US Forest Service's Stream System Technology Center (aka "Stream Team") website (www.stream.fs.fed.us) under their Download PDF Documents and Software Tools menu. Specific information concerning its use, application, sample size, data input, statistical analysis, and case studies are included in **various document sections of the software** and **should be read** prior to setting up a study and collecting any data. Next, select a reference site for each group of study sites being assessed or evaluated. Visit each reference site and collect the necessary biological samples (benthic macroinvertebrates) along with a pebble count (n≈200-300) from the same habitat unit(s) that the biological samples were collected. Using the USFS pebble count software (preferably streamside at the reference site) calculate the percent fines (< 2 mm) encountered at the reference site under the **data input tab**. The percent fines can be also calculated using the *Reference Reach* channel materials software (Mecklenberg, 1998) package. Using the percent fines value at the reference site, determine the increase in percent fines needed at the study site to classify them as either partially supporting (29% increase) or non-supporting (41% increase) according to Figure 1 and Table 1. This can be accomplished by multiplying the percent fines at the reference site by 1.29 and 1.41 respectively. Under the **sample size tab** in the software package, the sample sizes of both the reference and study sites can be estimated for statistical significance by filling in the worksheet provided which requires the following fields to be filled: **1)** Type 1 error probability (use 0.1), **2)** Type 2 error probability (use 0.2), **3)** ratio of study site sample size to reference site sample size (1 is recommended, but unequal sample sizes can be used), **4)** reference site percent fines or proportion (entered as a decimal percent i.e. 0.1 for 10%) , **5)** and the study site percent fines or proportion (reference site fines plus 29% or 41%). Finding the sampling number to cover a 29% increase will satisfy the sample size requirements and more for a 41% increase. **If the percent value for fines at the reference site is determined to be 20% or less, calculate the percent fines to be used in step 5 (study site fines or proportion) by choosing the greater value between either a 29% increase (reference fines multiplied by 1.29) or the percent increase obtained by using 21% as a raw fines percent at the study site(s).** The program will then calculate an estimated reference and study site sample size necessary to determine whether an increase in fines of 29% and 41% is statistically valid at the 10% level of significance (90% confidence level). Once the statistical sampling size(s) of both the reference and study site has been determined, the data can be collected, entered, and compared under the analysis section of the software and then subsequently used according to Tables 1 and 3.

Study sites showing fines of **20% or less should be considered non-impaired (fully supporting)** regardless of the percent fines determined at the reference site. If the percent fines at the study site are lower than that of the reference site, one might consider using the study site as a new reference site provided that the other criteria mentioned previously for reference site nomination are equal or better.

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B. Embeddedness (State of Idaho Procedure)

This method (Burton and Harvey, 1990) along with its accompanying software **should be used only on cobble-bottom or cobble-dominated streams** (D50 ≥64 mm or the greatest % fraction of any group is cobble). **Because this methodology is labor intensive, its use is recommended only when data from the pebble count and biological sampling does not provide a satisfactory answer as to the degree of impairment.** From the pebble count data, determine the D50 value of the stream bottom substrate. If it is found to be 64 mm or greater (or if the highest % fraction is cobble), proceed with the methodology described in the Idaho embeddedness protocol (Burton and Harvey, 1990). Embeddedness measurements should be performed on the same stream reach where the pebble count was performed. However, to avoid processing substrate previously disturbed from the pebble count, it is recommended that cross-sectional transects for the embeddedness measurements be located in between those used for the pebble count. For example, if the pebble count measurements were performed at cross-sectional transects listed as 0, 20, and 40 feet, etc. along the longitudinal profile of the river, the embeddedness measurements should be done at the distances of 10, 30, and 50 feet, etc. If a laptop computer is not used for field data entry and statistical determination of sample size adequacy, it is recommended that the substrate content of ten hoops (1/transect) be measured. After performing embeddedness measurements at both the reference and study site(s), the data should be entered and analyzed using computer program software developed for this procedure by the State of Idaho. The embeddedness derived from this procedure and subsequent analysis is termed a "weighted" embeddedness because it factors in percent fines along with the percent embeddedness of cobble within the hoop (Burton and Harvey, 1990; McDonald *et al.*, 1991). An additional calculation generated by this program is the interstitial-space index (ISI), which is a measure of unembedded substrate. This number should be used for inclusion in any database that statistically evaluates potential physical "indicators" of sedimentation and their relationship to biological integrity. As previously mentioned, studies by Bjornn indicate that approximately 33% embeddedness appears to be a "normal" stream condition. Therefore, **embeddedness percents of 33% or less encountered at a study site should be assessed as fully supporting** regardless of the values measured at the reference site. At values above 33%, a comparison of percent embeddedness between the reference and study sites can be performed using a T-test for significance in which the null hypothesis is s=s. If the hypothesis is accepted, then the percent mean embeddedness at both the reference and the study sites is similar and the aquatic life use is therefore supported or not impaired. If, however, the hypothesis is rejected (s≠s) then the study site mean should be divided by the reference mean (as mentioned previously with the pebble count) and multiplied by 100 to determine the percent increase in embeddedness at the study site. The increase in embeddedness and its effect on aquatic life use may be evaluated as follows: full support (comparable to reference), 0 to 10%; supporting, 11%-27%; partial support, 28%-40%; and non-support > 40% (Table 1).

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Table 1 Degree of aquatic life use support affected by stream bottom deposits (sediment) evaluated by increases in either fines or embeddedness, relative to a reference site.[1] Adapted and modified from Figure 1 (i.e. 100 - 90% = 0 - 10%).

Pebble Count Fines ≤ 2 mm (% increase over reference)[2]	Embeddedness (% increase over reference)[2]	Degree of Aquatic Life Use Support (Presumptive[1])
0 – 10%	0 – 10%	Full Support, Comparable to Reference [1,3]
11 – 27%	11 - 27%	Supporting[1,]
28 – 40%	28 – 40%	Partial Support[1]
> 40%	> 40%	Non-Support[1]

[1] Biological assessment is necessary for confirmation and statistical database.

[2] Raw data values used for these percent comparisons between reference and study sites needs to meet adequate sampling size requirements.

[3] Raw percent values of ≤20% fines (pebble counts) and ≤ 33% embeddedness at a study site should be evaluated as fully supporting regardless of the percent attained at the reference site.

3. Biological Assessment (Macroinvertebrates)

Since the narrative standard for stream bottom deposits is centered around a biological component, any assessment or evaluation of a stream bottom using physical criteria, such as pebble count and embeddedness, needs to be confirmed using some type of bioassessment. A biological assessment using EPA's Rapid Bioassessment Protocol (Plafkin *et al,* 1989; Barbour *et al.*, 1999) for macroinvertebrates must be included at the reference and study sites in which the pebble count and/or embeddedness procedures were performed to confirm the evaluations and to provide a database in which to infer or provide a statistical relationship between the physical and biological components. Prior to collection of macroinvertebrates, a habitat assessment (Plafkin *et al.,* 1989; Barbour *et al.*, 1999) of the site should be performed using both visual observation and measurements made in association with any other studies (pebble counts, embeddedness, Rosgen Level II or III, longitudinal profiles, etc.). This can be compared later with the habitat assessment at the reference site to yield additional information as to other potential sources of use impairment other than sediment. Habitat assessment categories are based on percentages derived from dividing the study site score by the reference site score. Assessment categories and the percent comparability to the reference site (Plafkin *et al.,* 1989) are as follows: comparable to reference, > 90%; supporting, 75-88%; partially supporting, 60-73%; and non-supporting, <58%. The missing 2% value between categories allows adjustments between categories based on professional judgment.

Macroinvertebrates for analysis should be collected in a riffle area and may consist of either three quantitative samples using a Hess sampler or three composited kick samples (semi-quantitative) covering an area of approximately one meter for one minute. For valid comparisons and analysis,

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Macroinvertebrates for analysis should be collected in a riffle area and may consist of either three quantitative samples using a Hess sampler or three composited kick samples (semi-quantitative) covering an area of approximately one meter for one minute. For valid comparisons and analysis,

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Final Assessment: Combined Application of Physical and Biological Assessments

Upon completion of physical and biological assessments for stream bottom deposits (sediments), a final assessment can be determined from the following matrix table (Table 3). This is accomplished by taking the increases between percent fines or embeddedness and matching it with the appropriate physical assessment use support category in the far left column. The physical assessment use category can then be matched with the biological assessment use category located on the top row to obtain a use support category for aquatic life use based on biological and physical indicators of increased stream bottom sediment. **It is noteworthy that under certain situations, the physical indicators (fines and/or embeddedness) may define various levels of full support, while the biological assessment may reveal lower levels of support. In these cases, factors other than sediment alone, such as extremes in pH, low oxygen, temperature, lack of stream flow, and toxicity, etc. may be responsible for a reduction in biological integrity at a particular site. These other perturbations may then be quantified by examining such things as chemical and physical data collected at or near the site in question.**

Table 3. Final assessment matrix for determining aquatic life use support categories by combining physical (% fines & embeddedness) and biological assessments as sediment indicators.

Biological / Physical	**Severely Impaired** 0-17%	**Moderately Impaired** 21-50%	**Slightly Impaired** 54-79%	**Non-impaired** 84-100%
Non-Support Fines or Embeddedness >40% increase	Non-Support	Partial Support	Full Support, Impacts Observed	Full Support, Impacts Observed
Partial Support Fines or Embeddedness 28-40%increase	Non-Support	Partial Support	Full Support, Impacts Observed	Full Support, Impacts Observed
Supporting Fines or Embeddedness 11-27% increase	Non-Support[1]	Partial support[1]	Full Support, Impacts Observed	Full Support
Full Support Fines or embeddedness <10% increase[2]	Non-Support[1]	Partial Support[1]	Full Support, Impacts Observed	Full Support

[1] Reduction in the relative support level for the aquatic life use in this particular matrix cell is probably not due to sediment. It is most likely the result of some other impairment (temperature, D.O., pH, toxicity, etc.), alone or in combination with sediment.

[2] Raw percent values of ≤20% fines (pebble counts) and ≤ 33% embeddedness at a study site should be evaluated as fully supporting regardless of the percent attained at the reference site.

Step by step procedure for evaluating whether sediment is impairing the aquatic life use at

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Upon completion of physical and biological assessments for stream bottom deposits (sediments), a final assessment can be determined from the following matrix table (Table 3). This is accomplished by taking the increases between percent fines or embeddedness and matching it with the appropriate physical assessment use support category in the far left column. The physical assessment use category can then be matched with the biological assessment use category located on the top row to obtain a use support category for aquatic life use based on biological and physical indicators of increased stream bottom sediment. **It is noteworthy that under certain situations, the physical indicators (fines and/or embeddedness) may define various levels of full support, while the biological assessment may reveal lower levels of support. In these cases, factors other than sediment alone, such as extremes in pH, low oxygen, temperature, lack of stream flow, and toxicity, etc. may be responsible for a reduction in biological integrity at a particular site. These other perturbations may then be quantified by examining such things as chemical and physical data collected at or near the site in question.**

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Full Support Fines or embeddedness <10% increase[2]	Non-Support[1]	Partial Support[1]	Full Support, Impacts Observed	Full Support

[1] Reduction in the relative support level for the aquatic life use in this particular matrix cell is probably not due to sediment. It is most likely the result of some other impairment (temperature, D.O., pH, toxicity, etc.), alone or in combination with sediment.

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Step by step procedure for evaluating whether sediment is impairing the aquatic life use at

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Sandy Bottom Streams

Sandy bottom streams or **stream bottom channels consisting mostly of fines (D84 <2mm) will require different methodologies** for proper analysis **not described in this document**. For instance, the necessary data needed for comparison of the physical component (stream bottom substrate size and distribution) between reference and study sites may require sieving (using 2.0mm, 1.0mm, 0.5mm, 0.25mm, 12.5mm and 0.063mm sieve sizes) of a standardized weight of dry stream bottom fines (Bunte and Abt 2001) while the biological component (benthic macroinvertebrates) may require the combined use of both artificial substrate samplers and multihabitat sampling by kicking and jabbing using a D-frame dip net (Barbour *et al.*, 1999). At present, **the bureau does not have a methodology or protocol that it can use for either detecting or assessing the effect of stream bottom deposits on sandy bottom streams**. Instead, it is seeking input and guidance from outside sources for specific methods and protocols that are not only scientifically sound but also time and cost effective to address this specific assessment problem.

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Appendix E
Treatment of Biological

NEW MEXICO

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NMED Surface Water Quality Bureau: http://www.nmenv.state.nm.us/swqb/swqb.html

Program Description

Starting in 1998 the New Mexico Environment Department's (NMED) Surface Water Quality Bureau (SWQB) had a goal of monitoring all watersheds in the state on a 5-year cycle. NMED has recently begun to survey fish populations to supplement the data from the NM Department of Game and Fish. NMED uses RBP collection methods and is currently working on assessment methods suitable for the depauperate fish population of New Mexico. The SWQB coordinates with the NM Department of Game and Fish to obtain the most current fishery assessments in the watersheds.

The benefits of this approach are:

- It provides a systematic, detailed review of water quality data and allows for a more efficient use of valuable monitoring resources;
- It provides information at a scale where implementation of corrective activities is feasible;
- With an established order of rotation and predictable sampling in each basin, it is easier to coordinate efforts with other programs and water quality entities, and program efficiency is enhanced and the basis for management decisions is improved.

Documentation and Further Information

Water Quality and Water Pollution Control in New Mexico, 2000 305(b):
http://www.nmenv.state.nm.us/swqb/305b_2000.html

State of New Mexico Standards for Interstate and Intrastate Surface Waters, December 16, 2001:
http://www.nmenv.state.nm.us/NMED_regs/swqb/20_6_4_nmac.html

Surface Water Quality Bureau Library: http://www.nmenv.state.nm.us/swqb/links.html#WPS_Library

For a list of and links to *Reports and Publications*, go to:
http://www.nmenv.state.nm.us/gwb/Technical%20resources/TSS.html#Reports

For a *Table of Contents* containing ALL Technical Reports and other information, go to:
http://www.nmenv.state.nm.us/gwb/Technical%20resources/TSS.html

For a list of and links to *Biological Databases*, go to:
http://www.nmenv.state.nm.us/gwb/Technical%20resources/TSS.html#Biological

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NEW MEXICO

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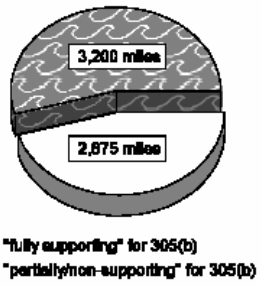
Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
	✓	promulgated into state water quality standards as biocriteria
		support of antidegradation
		evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
		other:
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(special projects only)*
	✓	fixed station (i.e., water quality monitoring stations) *(comprehensive use throughout jurisdiction)*
		probabilistic by stream order/catchment area
	✓	probabilistic by ecoregion, or statewide *(special projects only)*
	✓	rotating basin *(comprehensive use throughout jurisdiction)*
		other:

Stream Miles

Total miles *(State based determination)*	**110,741**
Total perennial miles	8,682
Total miles assessed for biology	**5,875**
fully supporting for 305(b)	3,200
partially/non-supporting for 305(b)*	2,675
listed for 303(d)*	–
number of sites sampled *(on an annual basis)*	30
number of miles assessed per site	–

5,875 Miles Assessed for Biology



*A total of 3,080 miles are partially/non-supporting when miles with "impacts observed" are included. NMED is currently working on a 303(d) list.

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Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Fishery Based Uses and Warm Water vs. Cold Water	
ALU designations in state water quality standards	Five designations: Coldwater Fishery, High Quality Coldwater Fishery, Limited Warmwater Fishery, Marginal Coldwater Fishery, and Warmwater Fishery	
Narrative Biocriteria in WQS	none	
Numeric Biocriteria in WQS	none	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
	✓	cause and effect determinations
		permitted discharges
	✓	monitoring (e.g., improvements after mitigation)
	✓	watershed based management
Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	none	

Reference Site/Condition Development

Number of reference sites	**200 total**	
Reference site determinations		site-specific
		paired watersheds
		regional (aggregate of sites)
	✓	professional judgment
		other:
Reference site criteria	The least disturbed sites are picked according to best professional judgment (based on chemistry, quantitative habitat measurements, visual indicators, etc). There are plans to shift to RIVPACS as biocriteria are developed during the next few years.	
Characterization of reference sites within a regional context *Not applicable*		historical conditions
		least disturbed sites
		gradient response
		professional judgment
		other:
Stream stratification within regional reference conditions		ecoregions (or some aggregate)
	✓	elevation *(preliminary ecoregions are based on elevation and other habitat parameters)*
		stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
		other:
Additional information		reference sites linked to ALU
		reference sites/condition referenced in water quality standards
	✓	some reference sites represent acceptable human-induced conditions

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Field and Lab Methods

Assemblages assessed	✓	benthos *(30 samples/year; single season, multiple sites - watershed level)*
	✓	fish *(30 samples/year; single season, multiple sites - watershed level)*
	✓	periphyton* *(9 samples/year; single observation, limited sampling)*
	✓	other: phytoplankton *(9 samples/year; single observation, limited sampling)*
Benthos		
sampling gear		Hess, D-frame, kick net (1 meter); 500-600 micron mesh
habitat selection		riffle/run (cobble)
subsample size		300 count
taxonomy		combination (it depends on the family--some to genus, some to species level)
Fish		
sampling gear		backpack and bank electrofisher; 1/4" mesh
habitat selection		multihabitat
sample processing		length measurement and anomalies
subsample		batch
taxonomy		species
Periphyton*		
sampling gear		**natural substrate:** collect by hand; **artificial substrate:** periphytometer
habitat selection		richest habitat and multihabitat
sample processing		taxonomic identification
taxonomy		diatoms only
Habitat assessments**		visual based, hydrogeomorphology; and the RBP assessment is conducted with the bioassessment. NMDE may also conduct a Rosgen type hydrogeomorphological assessment, including pebble counts, independently of the bioassessment.
Quality assurance program elements		standard operating procedures, quality assurance plan, sorting proficiency checks and specimen archival

*Periphyton is collected primarily from lakes. It is only collected from streams in response to a specific problem or when looking at a certain impairment – sampling is very minimal (<10).

**Up to this point bioassessments have been conducted as described in the EPA's RBP. These methods are just now starting to be refined for regional applicability.

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
		parametric ANOVAs
		multivariate analysis
	✓	biological metrics *(aggregate metrics into an index)*
		disturbance gradients
		other:
Multimetric thresholds		
transforming metrics into unitless scores		95th percentile of reference population
defining impairment in a multimetric index		95th percentile of reference population
Evaluation of performance characteristics		repeat sampling
		precision
Not currently evaluated		sensitivity
		bias
		accuracy
Biological data		
Storage		Just recently started using MS Access. All historic data (1977 - 1999) are in STORET
Retrieval and analysis		In the process of moving from STORET to MS Access; some data are also in Excel

BENTHIC MACROINVERTEBRATE SAMPLING PROTOCOLS

S U R F A C E W A T E R Q U A L I T Y B U R E A U
NEW MEXICO ENVIRONMENT DEPARTMENT
1190 St. Francis Drive, N2050
Santa Fe, New Mexico, USA 87505
Tel. (505) 827-0187 (505) 827-0160 Fax
www.nmenv.state.nm.us/swqb

QUALITATIVE

Wadeable Lotic Waters

Equipment

10 in. by 18 in. rectangular net, or 10 in. by 12 in. D-net with both having a 500-micron mesh size. Inspect netting for rips and excessive wear. Replace as needed.

Riffle

With the 10 in. X 18 in. net perform two 60 second kicks. With the 10 in X 12 in. net perform three 60 second kicks. Each kick sample consists of positioning the net downstream from the sampling area and disturbing the substrate for a distance of approximately one meter upstream from the net. Maintain solid contact between net and stream bottom substrate. The resulting kick samples are then composited. Kick samples are qualitative and given a standard unit effort by agitating an estimated area in front of the net for a given period of time and using this same area and time for all samples collected during the survey.

Pool

Pool samples are collected from fine-grained, organic-rich depositional habitats. The investigator walks back and forth over the chosen area disturbing and suspending the substrate and then sweeping above the disturbed area to capture dislodged or escaping invertebrates. This method minimizes the amount of debris trapped in the net. Between sweeps the net should be lifted out of the water or kept moving in a forward direction to prevent specimens from escaping. A standard time interval of 2 min should be used. The investigator should pass over the sampling area (~1-2 m^2) at least twice in the allotted time because subsequent passes often provide more specimens than are caught during the first pass. Pool samples should **not** be composited with any other samples.

Microhabitat

Microhabitat samples are qualitative samples collected from as many habitat types as possible in the sampling reach (submerged macrophyte beds, leaf packs, undercut banks, shallow depositional areas). The microhabitat sampling effort in each reach is limited to one hour or less. All microhabitat samples are collected using a D-frame kick net (500-

micron mesh) and supplemented by visual inspections and hand picking from woody snags, plants, rocks, and debris. Each microhabitat sample should be kept separate and **not** composited into a general Microhabitat sample.

Pupal Exuvia Samples

Ten minute pupal exuvia samples will be collected from each sample station in both lotic and lentic wadeable and non-wadeable waters following Ferrington (1987) and Ferrington *et al* (1991). Pupal exuvia samples are collected using a small white pan and a 180-micron mesh sieve. The pan is placed so that one side of the pan is approximately 1 mm beneath the water surface and then moved through the water so that the floating materials on the waters surface are "skimmed" and collected in the pan. The pan is then emptied into the 180-micron mesh sieve and the process is repeated for 10 minutes while moving upstream. Ideal locations for the collection of floating pupal exuvia are in backwater eddies, slack current areas, and next to emergent objects such as vegetation, snags, rocks, debris dams, etc.

Non-Wadeable Lotic Waters

Qualitative sampling techniques in large non-wadeable rivers are rather limited. In the large mainstem waters in the State the productive habitat for benthic macroinvertebrates is generally not the stream bottom but rather in the stream banks and woody debris. If qualitative samples are to be collected from such waters, care must be taken to include stream banks and woody debris in the sampling effort.

Wadeable Lentic Waters

Playas and Lake Littoral Areas

Equipment

10 in. by 18 in. rectangular net or 10 in. by 12 in. D-net with both having a 500-micron mesh size. Inspect netting for rips and excessive wear. Replace as needed. The net is drawn through a 16 feet diameter sweep while in contact with the substrate. Only one sample is taken per station. If rock, cobble, or woody substrates exist these should be handpicked. In addition, submerged vegetation should be examined for attached organism and hand picked.

QUANTITATIVE

Wadeable Lotic Waters

Equipment

Hess Sampler;Surber Sampler

Use a Wildco Canton modified Hess sampler; 500 micron mesh. Inspect all netting for rips and excessive wear. Replace as needed.

Hess Sampler

Embed base of sampler in substrate with sampler body mesh facing upstream and sample-collection net facing downstream. Remove each element of the substrate larger than two inches and, holding it in the current in front of the collection net, scrub it lightly with a stiff bristle brush to dislodge any macroinvertebrates. Manually agitate remaining fines to suspend any remaining macroinvertebrates. Perform five replicates. Do not composite samples. Habitat types must be consistent for all stations in a survey and should be documented in the field notes.

Surber Sampler

Use a Surber sampler; 500-micron mesh. NOTE: Surber samplers are not suited for use in streams with greater than 3.00 inches depth or in streams with greater than 1.0 cfs discharge. Inspect all netting for rips and excessive wear. Replace as needed. Embed base of sampler in substrate with sampler body opening facing upstream. Remove each element of the substrate larger than two inches and, holding it in the current in front of the collection net, scrub it lightly with a stiff bristle brush to dislodge any macro-invertebrates. Manually agitate remaining fines to suspend any remaining macroinvertebrates. Perform five replicates. Do not composite samples. Habitat types must be consistent for all stations in a survey and should be documented in the field notes.

Non-Wadeable Lotic Waters and Wadeable and Non-Wadeable Lentic Waters

Equipment

Hester–Dendy (HD) Samplers; Ekman Dredge Hester-Dendy

Three HD samplers will be placed at each station at varying depths from 0.25m – 2m and varying distances from the waters edge. HD samplers will be secured from both the top (i.e. snag) and the bottom (i.e. concrete block). HD samplers will be left at the sample location for 8 weeks allowing for adequate colonization time. Individual HD samplers will be collected and placed in separate collection containers to be brought back to the lab for analyses.

Ekman Dredge

Three Ekman Dredge samples will be collected at each station with no compositing of individual samples. Check all springs, hinges, release mechanism and messenger to assure they are in proper working order. Check suspension line for wear and replace as necessary. Dredge is lowered vertically until in contact with the substrate. Holding suspension line taught and vertical, drop messenger to release jaws of dredge. Retrieve

dredge and carefully retract jaws using the latching cables to decant contents into a screen-bottom bucket with mesh size of 500 microns. Plunge bucket repeatedly in water to wash sediments out of the sample bolus. Wash cleaned bolus from bucket into a no. 35 (500 micron mesh) soil sieve. Concentrate bolus and transfer into sample container. Wash residue on sieve bed into the sample container and cover bolus with preservative.

Field Sample Processing

When sampling is completed, the sampling device (e.g., kicknet, Hess, Ekman) is removed from the water and the collected material is emptied into the bucket and rinsed with water. The sample matrix is then poured through a Standard Size No. 35 Sieve and all contents are transferred into a plastic jar. The net, bucket, and sieve should be checked for remaining invertebrates. All remaining invertebrates should be picked from the net, bucket, and sieve and placed in the appropriate sample container.

Preservative

Preservative should then be added to the sample container. 95% Ethanol is added to the sample container to produce a final concentration of approximately 70% ethanol with dilution coming from water in the sample matrix and invertebrates. Samples that fill the sample container by more than 50% should then be refrigerated overnight, drained, and represerved in 95% ethanol the next day.

Labels

A label made from 100% cotton fiber bond paper marked by soft pencil or alcohol-proof pen (Pygmy) accurately describing the sampling location, including State, County, stream name, site number, date, replicate, sample type (Hess, Kicknet), sample habitat (Riffle, Pool, Microhabitat) and collector, is added to the inside of the bag or jar. The outside of the container should be similarly labeled using a waterproof felt pen (Sharpie). Careful records of sampling sites, times, GPS coordinates, and other germane observations should be kept in a waterproof, field note book.

Lab Sample Processing

Lab sample processing, subsampling, quality control, and macroinvertebrate taxonomy generally follows Barbour et al (1999) with a few exceptions.

1. Complete the sample log-in sheet to verify that all samples have arrived at the laboratory, and are in proper condition for processing.

2. Thoroughly rinse sample in a 500 µm-mesh sieve to remove preservative and fine sediment. Large organic material (whole leaves, twigs, algal or macrophyte mats, etc.) not removed in the field should be rinsed and visually inspected for organisms. Any organisms attached to the large debris or entangled in the algal or macrophyte mats should be removed and placed back in the sample matrix allowing the large debris and

algal and macrophyte mats to be discarded. If the samples have been preserved in alcohol, it will be necessary to soak the sample contents in water for about 15 minutes to hydrate the benthic organisms, which will prevent them from floating on the water surface during sorting. If the sample was stored in more than one container, the contents of all containers for a given sample should be combined at this time. Gently mix the sample by hand while rinsing to make homogeneous.

3. After washing, spread the sample evenly across a pan marked with grids. On the laboratory bench sheet, note the presence of large or obviously abundant organisms; *do not remove them from the pan, yet*.

4. Use a random numbers table to select numbers corresponding to squares (grids) within the gridded pan. Remove all material (organisms and debris) from the selected grid squares, and place the material into a shallow white pan and add a small amount of water to facilitate sorting. Count and Pick all organisms out of the pan and place in vials containing 95% Ethanol. If more than one vial is needed, each should be labeled separately with the State, County, sample identifier or lot number, date, stream name, sampling location, collector(s), and taxonomic group, and numbered (e.g., 1 of 2, 2 of 2).

5. Repeat Step 4 until a count of 300 organisms has been reached. In the likely event that the 300 organism count is reached while only having partially picked the contents of the *n*th grid, then continue picking organisms until the *n*th grid is completely picked. Any organism that is lying over a line separating two grids is considered to be on the grid containing its head. In those instances where it may not be possible to determine the location of the head (worms for instance), the organism is considered to be in the grid containing most of its body.

6. After reaching the 300 organism count perform a cursory sort for large and/or rare taxa that were not included in the original sort/count.

7. Save the sorted debris residue in a separate container for later Quality Control checks. Add a label that includes the words "sorted residue" in addition to all prior sample label information and preserve in 95% ethanol. Save the remaining unsorted sample debris residue in a separate container labeled "sample residue" in 95% Ethanol; this container should include the original sample label. Length of storage and archival is determined by the laboratory or benthic section supervisor.

8. Midge (Chironomidae) larvae and pupae should be cleared and mounted on slides in an appropriate medium (e.g., Euperal); slides should be labeled exactly as the corresponding sample vials including State, County, sample identifier or lot number, date, stream name, sampling location, and collector(s). As with midges, worms (Oligochaeta) must also be mounted on slides and should be appropriately labeled.

9. Fill out all information on Laboratory Bench Sheet as in field sheets. Complete back of sheet for subsampling/sorting information. Note number of grids picked, time expenditure, and number of organisms. If QC check was performed on a particular

sample, person conducting QC should note findings on the back of the Laboratory Bench Sheet.

10. Record date of sorting and slide mounting, if applicable, on Log-In Sheet as documentation of progress and status of completion of sample lot.

Subsampling Quality Control

1. Ten percent of the sorted samples in each lot should be examined by laboratory QC personnel or a qualified co-worker. (A lot is defined as a special study, basin study, entire index period, or individual sorter.) The QC worker will examine the sorted debris and will look for organisms missed by the sorter. Organisms found will be added to the sample vials. If the QC worker finds less than 10% of organisms remaining in the sorted debris, the sample passes; if more than 10% are found, the sample fails. If the first 10% of the sample lot fails, a second sample of the sample lot will be checked by the QC worker. Sorters in-training will have their samples 100% checked until the trainer decides that training is complete.

2. After laboratory processing is complete for a given sample, all sieves, pans, trays, etc., that have come in contact with the sample will be rinsed thoroughly, examined carefully, and picked free of organisms or debris; organisms found will be added to the sample residue.

Macroinvertebrate Taxonomy

Only those taxonomic keys that have been peer-reviewed and are available to other taxonomists should be used. Unnamed species (i.e., species A, B, 1, or 2) may be ecologically informative, but may be inconsistently handled among taxonomists and will, contribute to variability in our statewide database and resulting analysis.

1. All organisms are identified to the lowest practical level (generally genus or species) using a dissecting microscope and appropriate keys. Chironomidae are cleared and mounted on slides in Euparol and identified using a compound microscope. Each taxon found in a sample is recorded and enumerated in a laboratory bench notebook and then transcribed to the laboratory bench sheet for subsequent reports. Any difficulties encountered during identification (e.g., missing gills) are noted on these sheets.

2. Labels with specific taxa names and the taxonomist's initials are added to the vials of specimens by the taxonomist. Slides are labeled by the identifying taxonomist and include the taxon name and taxonomist initials.

3. Record the identity and number of organisms on the Laboratory Bench Sheet. Either a tally counter or "slash" marks on the bench sheet can be used to keep track of the cumulative count. Also, record the life stage of the organisms, the taxonomist's initials and the Taxonomic Certainty Rating (TCR) as a measure of confidence in the determination.

4. Use the back of the bench sheet to explain certain TCR ratings or condition of organisms. Other comments can be included to provide additional insights for data interpretation.

5. Voucher specimens for each taxa will be saved to establish reference collections for each sample station. For archiving samples, specimens will be placed in 70% Ethanol in tightly capped polyseal screw cap vials, grouped by station and date, and placed in vial trays. The ethanol level in these vials must be examined periodically and replenished as needed.

REFERENCES

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish*, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Ferrington, L.C. 1987. *Collection and identification of floating exuviae of Chironomidae for use in studies of surface water quality*. SOP No. FW 130A. U.S. Environmental Protection Agency, Region VII, Kansas City, Kansas.

Ferrington, L.C., Jr. M. A. Blackwood, C.A. Wright, N. H. Crisp, J.L. Kavanaugh and F. J. Schmidt**.** 1991. *A Protocol for Using Surface-Floating Pupal Exuviae of Chironomidae for Rapid Bioassessment of Changing Water Quality*. pp.181-190. In: Sediment and Stream Water Quality in a Changing Environment: Trends and Explanations. IAHS Publication Number 203. 374 pp.

Appendix F
Naming Conventions
(not available)

Appendix G
303(d) example

2004 State of New Mexico

303(d) List of Impaired Surface Waters

(Table of Contents of "Category 5" waters on the following Integrated 303(d)/305(b) List)

HUC: 11040001 Cimarron Headwaters
- Dry Cimarron River (Perennial reaches OK bnd to Oak Creek)
- Long Canyon (Perennial reaches abv Dry Cimarron)

HUC: 11080001 Canadian Headwaters
- Caliente Canyon (Vermejo River to headwaters)
- Chicorica Creek (Canadian River to Raton Creek)
- Lake Maloya
- Raton Creek (Chicorica Creek to headwaters)
- Stubblefield Lake
- VanBremmer Creek (HWY 64 to headwaters)
- York Canyon (Vermejo River to headwaters)

HUC: 11080002 Cimarron
- Eagle Nest Lake
- McCrystal Creek (North Ponil to headwaters)
- Middle Ponil Creek (South Ponil to headwaters)
- Ponil Creek (Cimarron River to confl of North & South Ponil)
- Springer Lake

HUC: 11080003 Upper Canadian
- Charette Lake (Lower)
- Conchas Reservoir

HUC: 11080004 Mora
- Coyote Creek (Mora River to Black Lake)
- Little Coyote Creek (Black Lake to headwaters)
- Mora River (Canadian River to USGS gage east of Shoemaker)
- Mora River (HWY 434 to headwaters)
- Mora River (USGS gage east of Shoemaker to HWY 434)
- Morphy (Murphy) Lake

HUC: 11080006 Upper Canadian-Ute Reserv
- Ute Reservoir

HUC: 11100101 Upper Beaver
- Clayton Lake

HUC: 12050002 Blackwater Draw
- Green Acres Lake

HUC: 12080001 Lost Draw
- Lane Salt Lake

HUC: 13010005 Conejos
- Rio de los Pinos (New Mexico reaches)
- Rio San Antonio (Montoya Canyon to headwaters)

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Appendix H
Assessment Protocols for Listing and Delisting

4.0 Assessment Unit Category Determinations for Integrated List

The determination of use support using Section 3.0 and other specified protocols are then combined to determine the overall water quality standard attainment category for each AU (USEPA 2001). The unique assessment categories for New Mexico are described as follows (see also Figure 4.1):

1. Attaining the water quality standards for all designated and existing uses. AUs are listed in this category if there are data and information that meet all requirements of the assessment and listing methodology and support a determination that the water quality criteria are attained.

2. Attaining some of the designated or existing uses based on numeric and narrative parameters that were tested, and no reliable monitored data is available to determine if the remaining uses are attained or threatened. AUs are listed in this category if there are data and information that meet requirements of the assessment and listing methodology to support a determination that some, but not all, uses are attained based on numeric and narrative water quality criteria that were tested. Attainment status of the remaining uses is unknown because there is no reliable monitored data with which to make a determination.

3. No reliable monitored data and/or information to determine if any designated or existing use is attained. AUs are listed in this category where data to support an attainment determination for any use are not available, consistent with requirements of the assessment and listing methodology.

4. Impaired for one or more designated uses, but does not require development of a TMDL because:

A. TMDL has been completed. AUs are listed in this subcategory once all TMDL(s) have been developed and approved by USEPA that, when implemented, are expected to result in full attainment of the standard. Where more than one pollutant is associated with the impairment of an AU, the AU remains in Category 5A (see below) until all TMDLs for each pollutant have been completed and approved by USEPA.

B. Other pollution control requirements are reasonably expected to result in attainment of the water quality standard in the near future. Consistent with the regulation under 130.7(b)(i),(ii), and (iii), AUs are listed in this subcategory where other pollution control requirements required by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

C. Impairment is not caused by a pollutant. AUs are listed in this subcategory if a pollutant does not cause the impairment. For example, USEPA considers flow alteration to be “pollution” vs. a “pollutant.”

5. Impaired for one or more designated or existing uses. The AU is not supporting one or more of its designated uses because one or more water quality standards are not attained according to current water quality standards and assessment methodologies. **This category constitutes the *CWA §303(d) List of Impaired Waters*.** In order to relay additional information to stakeholders including SWQB staff, Category 5 is further broken down into the following categories:

A. A TMDL is underway or scheduled. AUs are listed in this category if the AU is impaired for one or more designated uses by a pollutant. Where more than one pollutant is associated with the impairment of a single AU, the AU remains in Category 5A until TMDLs for all pollutants have been completed and approved by USEPA.

B. A review of the water quality standard will be conducted. AUs are listed in this category when it is possible that water quality standards are not being met because one or more current designated use is inappropriate. After a review of the water quality standard is conducted, a Use Attainability Analysis (UAA) will be developed and submitted to USEPA for consideration, or the AU will be moved to Category 5A and a TMDL will be scheduled.

C. Additional data will be collected before a TMDL is scheduled. AUs are listed in this category if there is not enough data to determine the pollutant of concern or there is not adequate data to develop a TMDL. For example, AUs with biological impairment will be listed in this category until further research can determine the particular pollutant(s) of concern. When the pollutant(s) are determined, the AU will be moved to Category 5A and a TMDL will be scheduled. If it is determined that the current designated uses are inappropriate, it will be moved to Category 5B and a UAA will be developed. If it is determined that "pollution" is causing the impairment (vs. a "pollutant"), the AU will be moved to Category 4C.

This change in reporting was developed in response to a recent National Research Council (NRC) report and a desire to provide a clearer summary of the nation's water quality status and management actions necessary to protect and restore them (NRC 2001, USEPA 2001). With a few additions and minor changes in terminology, the information requested in the *Integrated Listing* guidance (USEPA 2001) and CALM guidance (USEPA 2002a) were previously suggested in earlier 305(b) reporting guidance (USEPA 1997). The earlier guidance formed the basis of previous SWQB assessment protocols.

Assessment information is housed in ADB v.2 (RTI 2002). This database was designed to help states implement suggestions in the Integrated Listing guidance (USEPA 2001). The database is first populated with AU information, associated designated uses, comments, and any supporting documentation. Individual designated use attainment decisions (i.e., Full Support, Non Support, Not Assessed) are then entered for each AU. ADB v.2 then automatically determines the water quality standards attainment category for each AU based on the information entered for each applicable designated use.

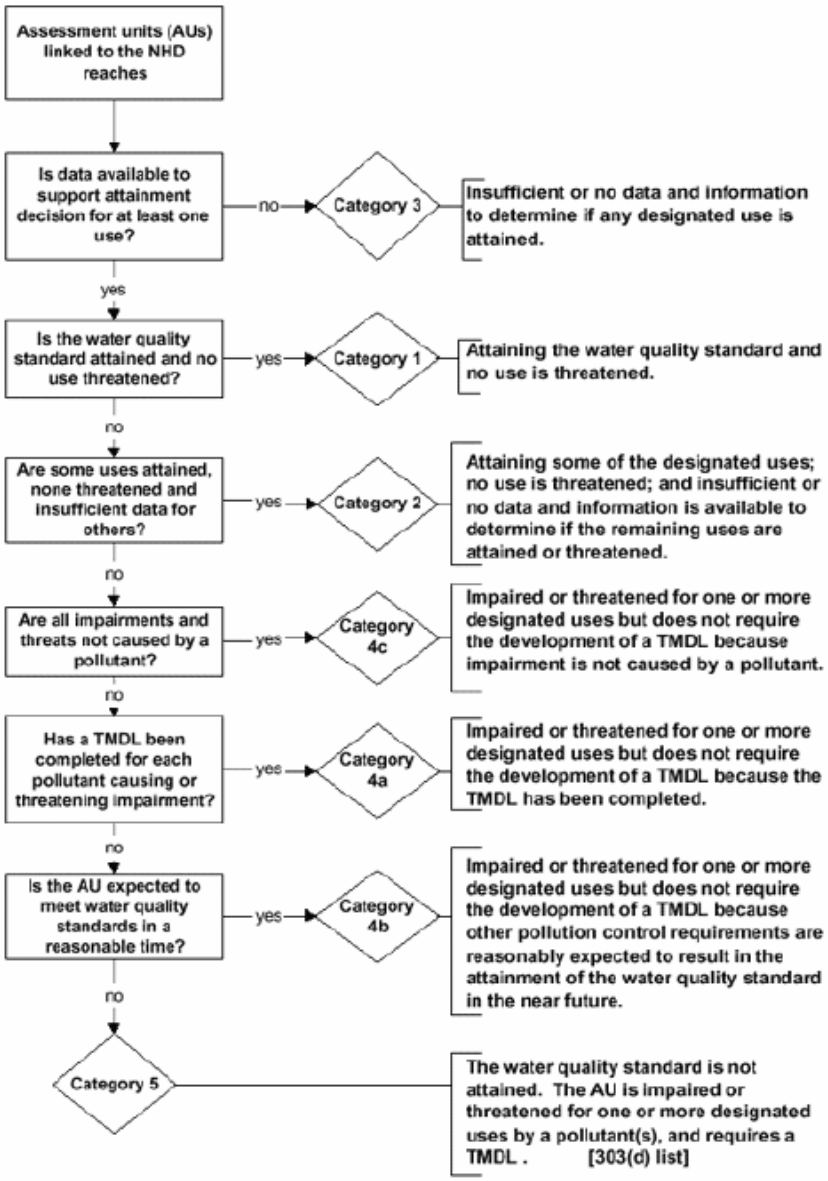

Figure 4.1. Generalized summary of logic for attainment categories (USEPA 2001). Category 5 was further expanded into categories 5A, 5B, and 5C.

XX) Appendices Map

Main Website – http://www.nmenv.state.nm.us/swqb/

- Library – http://www.nmenv.state.nm.us/swqb/links.html#WPS_Library
- Protocols - http://www.nmenv.state.nm.us/swqb/protocols/
- Standards for Interstate and Intrastate Surface Waters – http://www.nmenv.state.nm.us/NMED_regs/swqb/20_6_4_nmac.pdf
- 2004 Integrated List - http://www.nmenv.state.nm.us/wqcc/303d-305b/2004/index.html

Appendix A – Found in the State of New Mexico Procedure For Assessing Standards Attainment For The Integrated 303(d) / 305(b) Water Quality Monitoring and Assessment Report: Assessment Protocol at
http://www.nmenv.state.nm.us/swqb/protocols/AssessmentProtocol2003_v6.pdf
- See pages 8 through 22.

Appendix B – Found in the Standards For Interstate and Intrastate Surface Waters at
http://www.nmenv.state.nm.us/NMED_regs/swqb/20_6_4_nmac.pdf
See Standards Applicable to Attainable or Designated Uses under Numeric Standards Applicable to Uses
- See section 20.6.4.900.

Appendix C – Found in the Standards for Interstate and Intrastate Surface Waters and the 2002 305(b) report, respectively at
http://www.nmenv.state.nm.us/NMED_regs/swqb/20_6_4_nmac.pdf
- See section 20.6.4.101-104 for examples
http://www.nmenv.state.nm.us/swqb/305b/2002/2002_305b_Report-AppendixB.pdf
- See page 1

Appendix D – Found at Appendix B of the State of New Mexico Procedure For Assessing Standards Attainment For The Integrated 303(d) / 305(b) Water Quality Monitoring and Assessment Report: Assessment Protocol at
http://www.nmenv.state.nm.us/swqb/protocols/APP_D-SBD_Sedimentation_Protocol.pdf

Appendix E – Found on a PDF created by the EPA entitled "Summary of Bioassessment Programs and Biocriteria Development" – Dec. 2002.
http://www.epa.gov/bioindicators/pdf/NM_summary_final.pdf

Appendix F – not available

Appendix G – Example found in Appendix B of the 2004 Integrated List
http://www.nmenv.state.nm.us/wqcc/303d-305b/2004/AppendixB/2004_303d-305b_Report-AppendixB-303dList.pdf
- See page 1

Appendix H - Found in the State of New Mexico Procedure For Assessing Standards Attainment For The Integrated 303(d) / 305(b) Water Quality Monitoring and Assessment Report: Assessment Protocol at
http://www.nmenv.state.nm.us/swqb/protocols/AssessmentProtocol2003_v6.pdf

- See pages 23-25

The Clean Water Act: NORTH DAKOTA

I) DWQ and State Review Process

The North Dakota Department of Health, Division of Water Quality (DWQ) works to safeguard water quality for all uses. Programs within the Division deal with various aspects of protecting the quality of our water resources. Enforcement of state and federal environmental laws is accomplished through permitting, inspection, sampling, analytical services and monitoring activities.

SURFACE WATER PROTECTION PROGRAM:

- Nonpoint Source Pollution Prevention
- Total Maximum Daily Loads
- River and Lake Assessments
- Fish Consumption Advisories

SPECIAL PROJECTS:

- Water Quality Standards
- Section 401 Water Quality Certification
- Devils Lake Issues
- Missouri River Issues
- Interstate and International Water Issues
- EIS Review

Triennial Review:

Given the EPA requirements for states to report on the quality of their waterbodies, states create timelines for review of watershed regulations found in this document. This is the "Triennial Review Process" which can vary from state to state in the actual scheduled review hearing timeline. No such schedule for ND watersheds and regulations is found on the ND DWQ website, although could be upon contacting the ND Department of Water Quality. The website gives valuable information regarding results of watershed monitoring programs rather than the process itself.

Public comment and participation is an important part of the triennial review process. Following is an example of the process that was undergone for the draft 2002 TMDL list:

Public comment was solicited on the draft 2002 TMDL list through a public notice published between November 23 and 27, 2002 in eight major daily newspapers located across the state.

Through this public notice the public was encouraged to obtain a copy of the draft TMDL list by contacting the department in writing, by phone, or by accessing the list through the Department's web site at www.health.state.nd. No public comments were received following the end of the comment period which ended on December 27, 2002.

Comment on the draft TMDL list was also requested from specific natural resource agencies and organizations in the state (e.g., Natural Resources Conservation Service,

US Fish and Wildlife Service, local soil conservation districts), the state Water Pollution Advisory Board, NRCS State Technical Committee, and from EPA Region VIII. Through this process comments were only received from EPA Region VIII. These comments have been addressed in the final 2002 Section 303(d) TMDL list.

II) Contacts

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To get on an agency's mailing list for:

Proposed Water Quality Rule Changes
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Send a written request.

NPDES Permits
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Department of Health
Division of Water Quality
1200 Missouri Ave.
Bismarck, ND 58506
dfewless@state.nd.us

Send a written request.

Triennial Review Hearings
Dennis Fewless
Department of Health
Division of Water Quality
1200 Missouri Ave.
Bismarck, ND 58506
dfewless@state.nd.us

Send a written request.

III) List of Designated Uses

The designated uses of waters in North Dakota include:

- Aquatic life
- Agriculture
- Industrial
- Municipal or domestic
- Recreation
- Fishing and wildlife

The waters are classified according to the level that these waters can support these uses simultaneously and without deleterious effects:

1) Class I streams The quality of the waters in this class shall be suitable for the propagation and/or protection of resident fish species and other aquatic biota and for swimming, boating, and other water recreation. The quality of the waters shall be for irrigation, stock watering, and wildlife without injurious effects. After treatment consisting of coagulation settling, filtration, and chlorination, or equivalent treatment processes, the water quality shall meet the bacteriological, physical, and chemical requirements of the department for municipal or domestic use.

2) Class IA streams The quality of the waters in this class shall be the same as the quality of class I streams, except that treatment for municipal use may also require softening to meet the requirements of the department.

3) Class II streams The quality of the waters in this class shall be the same as the quality of class I streams, except that additional treatment may be required to meet the drinking water requirements of the department. Streams in this classification may be intermittent in nature which would make these waters of limited value for beneficial uses such as municipal water, fish life, or irrigation.

4) Class III streams The quality of the waters in this class shall be suitable for agricultural and industrial uses such as stock watering, irrigation, washing, and cooling. These streams have low average flows and, generally, prolonged periods of no flow. They are of limited seasonal value for immersion recreation, fish life, and aquatic biota. The quality of these waters must be maintained to protect recreation, fish, and aquatic biota.

5) Wetlands These water bodies are to be considered waters of the state and will be protected under section 33-16-02-08.

6) Lakes The type of fishery a lake may be capable of supporting is based on the lake's geophysical characteristics. However, the capability of the lake to support a fishery may be affected by seasonal variations or other natural occurrences which may alter the lake characteristics.

    - Class 1 - Cold water fishery Waters capable of supporting growth of salmonid fishes and associated aquatic biota.

    - Class 2 - Cool water fishery Waters capable of supporting growth and propagation of nonsalmonid fishes and marginal growth of salmonid fishes and associated aquatic biota.

    - Class 3 - Warm water fishery Waters capable of supporting growth and propagation of nonsalmonid fishes and associated aquatic biota.

    - Class 4 - Marginal fishery Waters capable of supporting a fishery on a seasonal basis.

    - Class 5 - Not capable of supporting a fishery due to high salinity.

For criteria used to determine use attainment see Appendix A

IV) Water Quality Classified Uses and Antidegradation Policy

Designated water classifications from above are divided into three categories that are described in Montana's Antidegradation Policy. These categories determine the procedures used to stop the degradation of water quality in the state.

For Montana's Antidegradation Policy and Water Quality Classified Uses see the document entitled "Antidegradation Policies by State."

V) Basic Standards / Criteria

Definitions:

"Acute standard" means the one-hour average concentration does not exceed the listed concentration more than once every three years on the average.

"Chronic standard" means the four-day average concentration does not exceed the listed concentration more than once every three years on the average.

33-16-02.1-08. General water quality standards.

1) Narrative standards

a) The following minimum conditions are applicable to all waters of the state except for Class II ground waters. All waters of the state shall be:

i) Free from substances attributable to municipal, industrial, or other discharges or agricultural practices that will cause the formation of putrescent or otherwise objectionable sludge deposits.

ii) Free from floating debris, oil, scum, and other floating materials attributable to municipal, industrial, or other discharges or agricultural practices in sufficient amounts to be unsightly or deleterious.

iii) Free from materials attributable to municipal, industrial, or other discharges or agricultural practices producing color, odor, or other conditions to such a degree as to create a nuisance or render any undesirable taste to fish flesh or, in any way, make fish inedible.

iv) Free from substances attributable to municipal, industrial, or other discharges or agricultural practices in concentrations or combinations which are toxic or harmful to humans, animals, plants, or resident aquatic biota. For surface water, this standard will be enforced in part through appropriate whole effluent toxicity requirements in North Dakota pollutant discharge elimination system permits.

v) Free from oil or grease residue attributable to wastewater, which causes a visible film or sheen upon the waters or any discoloration of the surface of adjoining shoreline or causes a sludge or emulsion to be deposited beneath the surface of the water or upon the adjoining shorelines or prevents classified uses of such waters.

b) There shall be no materials such as garbage, rubbish, offal, trash, cans, bottles, drums, or any unwanted or discarded material disposed of into the waters of the state.

c) There shall be no disposal of livestock or domestic animals in waters of the state.

d) The department shall propose and submit to the state engineer the minimum stream flows of major rivers in the state necessary to protect the public health and welfare. The department's determination shall address the present and prospective future use of the rivers for public water supplies, propagation of fish and aquatic life and wildlife, recreational purposes, and agricultural, industrial, and other legitimate uses.

e) No discharge of pollutants, which alone or in combination with other substances, shall:

   i) Cause a public health hazard or injury to environmental resources;

   ii) Impair existing or reasonable beneficial uses of the receiving waters; or

   iii) Directly or indirectly cause concentrations of pollutants to exceed applicable standards of the receiving waters.

f) If the department determines that site-specific criteria are necessary and appropriate for the protection of designated uses, procedures described in the environmental protection agency's Water Quality Standards Handbook (1994) or other defensible methods may be utilized to determine maximum limits. Where natural chemical, physical, and biological characteristics result in exceedences of the limits set forth in this section, the department may derive site-specific criteria based on the natural background level or condition. All available information shall be examined, and all possible sources of a contaminant will be identified in determining the naturally occurring concentration. All site-specific criteria shall be noticed for public comment and subjected to other applicable public participation requirements prior to being adopted.

2) Numeric standards
For Numeric Criteria of North Dakota waters see Appendix A. Chemical Parameters are listed by their given CAS No. (Chemical Abstracts Service Registry Number).

a) Class I streams
Unless stated otherwise, maximum limits for class I streams are listed in Table 1 and Table 2. For these tables see Appendix B.

b) Class IA streams
The physical and chemical criteria shall be those for class I, with the following exceptions:

Substance or Characteristic Maximum Limit:

- -Chlorides (Total) 175 mg/l
- -Sodium 60% of total cations as mEq/l
- -Sulfate (Total) 450 mg/l

c) Class II streams

The physical and chemical criteria shall be those for class IA, with the following exceptions:

Substance or Characteristic Maximum Limit:
- -Chlorides (Total) 250 mg/l
- -pH 6.0-9.0

d) Class III streams
The physical and chemical criteria shall be those for class II, with the following exceptions:

Substance or Characteristic Maximum Limit:
- -Sulfate (Total) 750 mg/l

e) Lakes

i) The beneficial uses and parameter limitations designated for class I streams shall apply to all classified lakes. However, specific background studies and information may require that the department revise a standard for any specific parameter

ii) In addition, these nutrient parameters are guidelines for use as goals in any lake improvement or maintenance program:

Parameter Limit
- NO3 as N .25 mg/l
- PO4 as P .02 mg/l

iii) The temperature standard for Class I streams does not apply to Nelson Lake in Oliver County. The temperature of any discharge to Nelson Lake shall not have an adverse effect on fish, aquatic life, and wildlife, or Nelson Lake itself.

History: Effective June 1, 2001.
General Authority: NDCC 61-28-04
Law Implemented: NDCC 23-33, 61-28

VI) Assessment Protocols Used to Determine Standards

This information was not found at this time. Contact the ND DWQ for such protocols.

VII) Stream Segmentation System

Watersheds in North Dakota are segmented for water quality management according to their designated use classifications and water quality. These use classifications are shown above in III) List of Designated Uses

For Stream Classifications and examples of some lake classifications see Appendix C. These examples and more can be found in the Standards of Quality for Waters of the State, March 2001, published by the ND Department of Health.
In order to delineate and define Assessment Units (AUs) used in the Assessment Data Base (ADB), the department followed a general set of guidelines:

1) Each AU is within the eight-digit USGS hydrologic unit.

2) Each river and stream AU was comprised of stream reaches of the same water quality standards classification (I, IA, II, or III).

3) To the extent practical, each AU is within a contiguous level IV ecoregion.

4) Mainstem perennial rivers were delineated as separate AUs. Where these rivers join with another major river or stream within the eight-digit hydrologic unit, the river was further delineated into two or more AUs.

5) Tributary rivers and streams, which are named on USGS 1:100,000 scale planimetric maps, were delineated as separate AUs. These AUs may have been further delineated, based on stream order or water quality standards classification.

6) Unnamed ephemeral tributaries to a delineated AU were consolidated into one unique AU. This was done primarily for accounting purposes, so that all tributary stream reaches identified in the National Hydrography Dataset (NHD) are included in the ADB.

7) Stream reaches, which were identified in the NHD and on USGS 1:24,000 scale maps and which did not form either an indirect or direct hydrologic connection with a perennial stream, were not included in the ADB. This would include small drainages which originate and flow into closed basin lakes or wetlands. (Note: This delineation criterion does not apply to tributaries to Devils Lake.)

VIII) Treatment of Water Column

The quality of the water column is subject to both narrative and numeric standards as listed above in V) Basic Standards/Criteria and shown in Appendix B. These criteria are applied to sections of watersheds based on their use, as shown in Appendix C.

IX) Treatment of Physical Habitat

Physical habitat is assessed while monitoring ND lakes and streams. This assessment is put into use mostly while evaluating aquatic life classifications attainment. The 2000 305(b) report states that “Nonpoint Source (NPS) pollution (e.g., nutrient loading, siltation of the streambed, and stream habitat loss or degradation) was the primary cause of aquatic life use impairment.” This information is used to promote stream restoration projects where possible.

X) Treatment of Sediment

Sedimentation and siltation are assessed while monitoring ND lakes and streams. This assessment is put into use mostly while evaluating aquatic life classifications attainment. The 2000 305(b) report states that "Nonpoint Source (NPS) pollution (e.g., nutrient loading, siltation of the streambed, and stream habitat loss or degradation) was the primary cause of aquatic life use impairment."

XI) Treatment of Biological

Goal:

The biological condition of surface waters shall be similar to that of sites or waterbodies determined by the department to be regional reference sites.

Implementation:

The intent of the state in adopting a narrative biological goal is solely to provide an additional assessment method that can be used to identify impaired surface waters. Regulatory or enforcement actions based solely on a narrative biological goal, such as the development and enforcement of North Dakota pollutant discharge elimination system permit limits, are not authorized. However, adequate and representative biological assessment information may be used in combination with other information to assist in determining whether designated uses are attained and to assist in determining whether new or revised chemical-specific permit limitations may be needed. Implementation will be based on the comparison of current biological conditions at a particular site to the biological conditions deemed attainable based on regional reference sites. In implementing a narrative biological goal, biological condition may be expressed through an index composed of multiple metrics or through appropriate statistical procedures.

History: Effective June 1, 2001.
General Authority: NDCC 61-28-04
Law Implemented: NDCC 23-33, 61-28

The North Dakota Department of Health (NDHD) initiated its biological monitoring and assessment program in 1993 and 1994 as part of an interagency project to develop a multimetric index of biological integrity (IBI) for fish in the Lake Agassiz Plain ecoregion, Red River of the North Basin. In addition to the Department of Health, other agencies involved in the project were the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, EPA Region V, and the USGS – Red River National Water Quality Assessment (NAWQA) project team. The project resulted in a 12 metric IBI for fish which distinguished among headwater, moderate, and large sized rivers.

Since 1995, NDHD has conducted biological monitoring in each of the state's four major river basins. The Department's biological monitoring and assessment efforts continued in the Red River of the North Basin in 1995 and 1996. In addition to fish, the Department began sampling macroinvertebrates in 1995. In 1997 and 1998, monitoring and assessment efforts were expanded to the Souris River and James River basins, respectively, and in 1999 and 2000 the Department sampled the Missouri River Basin. In

addition to fish and macroinvertebrate samples collected at each site, NDHD also conducted a habitat assessment following EPA's Rapid Bioassessment Protocol. Preliminary multimetric IBIs have been developed for fish and macroinvertebrates in the Red River Basin and for fish in the Souris River Basin. These IBIs have been used to assess aquatic life use support for the 2000 Section 305(b) report. As these IBIs are refined and as additional IBIs are developed for the remaining river basins, it is the Department's intent to include these biological assessments in future Section 305(b) reports as well as in the development of Section 303(d) TMDL lists.

NDHD is currently collaborating with North Dakota State University and EPA Region VIII in a two year pilot project to evaluate the response of the benthic periphyton community to varying summer growing season nutrient levels with the goal of developing regional nutrient criteria. Based on the results of this pilot project, NDHD may include periphyton in future biological monitoring and assessment activities, especially in relation to nutrient enrichment and eutrophication.

The Department is also a collaborator with EPA in the EMAP Western Pilot Project. The EMAP Western Pilot is currently in the third year of a four year project. By collaborating in this 12 state project, the Department hopes to integrate EMAP sampling design as well as EMAP sampling protocols into future biological monitoring and assessment projects. When NDHD's commitment to this project is completed in 2004, it's the Department's plan to begin its rotating basin monitoring program with the Red River Basin.

For an overview of North Dakota's Biological Assessment, see Appendix E

XII) Treatment of Wetlands

For information on the Treatment of Wetlands in North Dakota, see a separate document entitled "Treatment of Wetlands by State."

XIII) 305b Reports

Section 305(b) of the Clean Water Act requires that states, territories, and jurisdictions assess their water quality biennially and report those findings to the U.S. Environmental Protection Agency (EPA). EPA then summarizes the findings in a national water quality inventory. It is important to note that this report is no longer a Report to Congress, pursuant to Public Law 104-66, the Federal Reports Elimination and Sunset Act of 1995. To assess water quality, states and other jurisdictions compare their monitoring results to the water quality standards they have set for their waters. Water quality standards consist of three elements: the designated uses assigned to waters (such as drinking, swimming, or fishing), criteria to protect those uses (such as chemical-specific thresholds that should not be exceeded), and an antidegradation policy intended to keep waters that *do* meet standards from deteriorating from their current condition.

For the 2000 ND 305(b) report go to
http://www.health.state.nd.us/wq/sw/Z7_Publications/305(b)Reports/2000_305b.pdf
The primary purpose of this *State Water Quality Assessment Report*, otherwise known as the Section 305(b) Report, is to assess and report on the extent to which beneficial

uses of the state's rivers, streams, lakes, reservoirs, and wetlands are met. The report also summarizes or reports on the quality and condition of the state's ground water and describes management programs used to protect and improve surface and ground water quality. Section 305(b) of the Clean Water Act requires states to submit this assessment report every two years; therefore, the information presented in this report is for the reporting period of 1998-1999. This report is not a trends report, nor should the data or information in this report be used to assess water quality trends.

Factors which complicate and prohibit comparisons between reporting years include changes in the number of sites and the quality of data upon which assessment information is based, and changes to the estimated river and stream miles. The North Dakota Department of Health (hereafter referred to as the Health Department) currently recognizes 223 lakes and reservoirs for water quality assessment purposes. Of this total, there are 134 manmade reservoirs and 89 natural lakes with a combined surface acreage of 714,910 acres. Based on EPA's River Reach File Version 3 (RF3), there are 54,427 miles of rivers and streams in the state.

The 305(b) data from each state is compiled into a National Water Quality Inventory biennially. The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

The 2002 National Water Quality Inventory is the latest report available and can be accessed at *www.epa.gov/305b/2000report/alhi.pdf*

XIV) 303d lists

Section 303(d) of the federal Clean Water Act (and related regulations requires states to assess the condition of their waters to determine where water quality is impaired (does not fully meet standards) or threatened (is likely to violate standards in the near future). The result of this review is the 303(d) list, which must be submitted to the EPA every other year. Section 303(d) also requires states to prioritize and target water bodies on their list for development of water quality improvement strategies (i.e. TMDLs), and to develop such strategies for impaired and threatened waters.

In considering whether or not applicable water quality standards are being met, the state should not only consider the narrative and numeric criteria set forth in the standards to protect specific uses, but also the classified uses defined for the waterbody and whether the use or uses are fully supported or not supported due to any pollutant source or cause. Therefore, a waterbody could be considered water quality limited when it can be demonstrated that a beneficial use (e.g., aquatic life or recreation) is impaired even when there are no demonstrated exceedences of either the narrative or numeric criteria. Even when there is use impairment and no exceedence of the numeric standard the state should provide information as to the cause of the impairment. Where the specific pollutant (e.g., copper or phosphorus) is unknown a general cause category (e.g., metals or nutrients) should be included with the waterbody listing.

The decision to list a waterbody as water quality limited is not taken lightly, as it means that state and local water resource managers will commit significant resources, financial and personnel, in order to develop TMDLs necessary to restore the beneficial uses of the affected waterbody. Therefore, when the state makes a decision to list a waterbody as water quality limited and in need of a TMDL to restore beneficial uses, it is necessary for that decision to be based on credible water quality data and/or information. When compiling data and information used to develop its list, EPA requires states to consider "all existing and readily available water quality related data and information." The primary source of information by which the state compiles its Section 303(d) list is the state 2002 Section 305(b) water quality assessment. Waterbodies identified in the Section 305(b) water quality assessment as not supporting beneficial uses or waterbodies which are currently fully supporting beneficial, but are not expected to be supporting one or more beneficial uses within the next two years (termed fully supporting, but threatened) due to a pollutant or pollutants are included in the Section 303(d) list as waterbodies needing a TMDL. Other sources of data or information which are considered in compiling the TMDL list include, waterbodies for which dilution calculations or predictive models indicate exceedences of applicable narrative or numeric water quality standards, and waterbodies for which water quality problems or potential problems have been reported by local, state, or federal agencies; members of the public; or academic institutions.

Waterbodies are listed in the 303(d) list by their assessment Unit ID Number. The other column headings include:

- Assessment Unit (AU) description
- AU size
- Designated Use
- Use Support (Fully Supporting, Not Supporting, Threatened)
- Impairment (Parameter that is limiting Use Attainment)
- TMDL Priority (see footnote after the example 303(d) list table)

The 2002 North Dakota 303(d) list can be found at
http://www.health.state.nd.us/wq/sw/Z7_Publications/303(d)Lists/TMDL_2002.pdf

For an example page of the 2004 303(d) list see Appendix G

XV) Assessment protocols for listing and delisting

EPA will review and approve, partially approve/disapprove, or disapprove state or territorial 303(d) lists of impaired and threatened waters requiring a TMDL (Category 5). EPA's review and approval of the 303(d) list will be based on a determination that the state's or territory's assessment and listing methodology was used to prepare the list, that the assessment and listing methodology is scientifically sound, that it is consistent with the state's or territory's water quality standards, and that the state or territory reasonably considered all existing and readily available data and information, and listed

all waters not attaining water quality standards. Upon completing its review of the 303(d) list, EPA will send a letter to the state or territory notifying it of full approval, partial approval/disapproval, or disapproval. If the list is partially approved/disapproved, or disapproved, EPA will develop a list for the state or territory. EPA will also provide 30 days for public comment on the EPA developed list.

For purposes of Section 303(d) assessment and listing, the Department will use only what it considers to be sufficient and credible data. Sufficient and credible data are chemical, physical and biological data that, at a minimum, meet the following criteria:

- Data collection and analysis followed known and documented Quality Assurance/ Quality Control procedures.
- Water column chemical data were 5 years old or less for rivers and streams and 10 years or less for lakes, unless there was adequate justification to use older data (e.g., land use or climatic conditions have not changed). Fish tissue methyl mercury data are 5 years old or less.
- There are a minimum of 10 fish tissue samples per species per lake, reservoir, or river representing the range in sizes classes present in the waterbody.
- There are a minimum of 10 chemical samples or one biological (fish or macroinvertebrate) sample collected in the five year period. In the case of chemical samples, the 10 samples may consist of 2 samples collected in each of the five years or 10 samples all collected in one year.

Note: In some cases there may be overwhelming evidence to list a waterbody as impaired even though there may less than 10 samples collected within a five year period. For example, if only four or five chemical samples were collected within a five year period and all of them exceeded the water quality standard, then the water body would be listed as impaired based on this "overwhelming evidence."

<u>The following are the primary reasons for de-listing an AU</u>:

- Based on most recent data, use is fully supported.
- Use impairment due to a non-pollutant (habitat).
- Lacks sufficient credible data and/or information to make a use support determination. In most cases, when the original assessment was judged not to be representative of current water quality conditions due to a lack of sufficient credible data, one of the following usually occurred.
- The data used to conduct the assessment are now greater than 5 years old for rivers and streams and 10 years old for lakes and reservoirs and based on best professional judgment the assessment is no longer believed to be valid. This would occur if is believed that water quality has been altered due to significant changes in land use and/or due to climatic changes.
- The original assessment was based only on best professional judgment.

- The original assessment was based on data extrapolated from a monitoring station(s) located in an adjacent AU. River and stream assessment units listed during the last cycle as threatened or impaired due to nutrients were also de-listed. These assessment units will remain off the TMDL list until scientifically defensible nutrient criteria are developed.

XVI) Assessment for National Point Source Discharge Elimination System (NPDES) permits

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

North Dakota is a delegated permit authority.

XVII) Resources

River Network: http://www.rivernetwork.org/index.cfm

State-by-State Clean Water Act: http://www.rivernetwork.org/cleanwater/cwa_search.asp

National Water Quality Control Council (NWQCC); data comparability and collaboration: http://wi.water.usgs.gov/pmethods/mdcbfs.pdf

NWQCC minimum list of metadata elements: http://wi.water.usgs.gov/pmethods/elements/list.htm

ND Department of Health, Division of Water Quality: http://www.health.state.nd.us/wq/

ND Water Quality Standards: http://www.health.state.nd.us/wq/sw/Z7_Publications/B_NDCC_WQS.pdf

2002 North Dakota 303(d) list: http://www.health.state.nd.us/wq/sw/Z7_Publications/303(d)Lists/TMDL_2002.pdf

For a copy of the *National Water Quality Inventory:2000 Report* (EPA-841-R-02-001), visit *www.epa.gov/305b/2000report/alhi.pdf* or call the EPA's National Service Center for Environmental Publications at 1-800-490-9198

EPA National TMDL home page: This site provides an overview of the national TMDL program with links to pertinent information on state programs. It includes information on TMDL laws and regulations, policies, documents, examples of TMDLs, and more. www.epa.gov/owow/tmdl

EPA Region 8 TMDL program: This site provides specific information on TMDL programs in EPA Region 8 (Montana, Wyoming, North Dakota, South Dakota, Colorado, and Utah). www.epa.gov/Region8/water/tmdl/index.html

Adopt Your Watershed: Learn about organizations active in your watershed! Over 4,000 watershed groups are listed. Also includes tools and resources to help new groups get started. Visit EPA's Adopt Your Watershed site at www.epa.gov/adopt/

Surf Your Watershed: This site provides multi-level water resource information. Enter your zip code and learn the facts about your watershed and ways you can get involved. Visit EPA's Surf Your Watershed site at www.epa.gov/surf

XVIII) Glossary

Acronyms

- AU – Assessment Units
- ADB –Assessment Data Base
- CAS # - Chemical Abstracts Service Registry Number
- CWA – Clean Water Act
- DWQ – Division of Water Quality
- EIS Review – Environmental Impact Statement/Study Review
- EPA – Environmental Protection Agency
- IBI – Index of Biological Integrity
- NAWQA – National Water Quality Assessment
- NDHD – North Dakota Department of Health
- NHD – National Hydrography Dataset
- NRCS – Natural Resources Conservation Service
- TMDL's – Total Maximum Daily Loads
- WQS – Water Quality Standards

- USFWS – United States Fish and Wildlife Service
- USGS – United States Geological Survey
- NPDES – National Pollutant Discharge Elimination System

Clean Water Act Words (Section 1)

Regular font definition found in state documents*, italic font definitions not directly found in state documents and thus might be different*

- Acute Standard – means the one-hour average concentration does not exceed the listed concentration more than once every three years on the average.
- Chlorination – *a treatment applied to water that applies chorine to protect users from certain pollutants such as bacteria.*
- Coagulation – *to cause transformation of (liquid or solid for example) into or as if into a soft, semi-solid or solid mass, which might affect fate and transport of pollutants.*
- Chronic Standard – means the four-day average concentration does not exceed the listed concentration more than once every three years on the average.
- Ephemeral – *water bodies that do not have continuous surface flow in space or time, creating an associated aquatic life assemblage adapted to periods without surface water.*
- Filtration – *the act or process of filtering, a porous material through which a liquid or gas is passed to separate the fluid from suspended particles.*
- Ground Water – *are subsurface waters in a zone of saturation which are or can be brought to the surface of the ground or to surface waters through wells, springs, seeps or other discharge areas.*
- Macroinvertebrate – *organisms that reside the majority of their life cycle on the bottom of running water ecosystems such as rivers. Some benthic taxa are also found in wetland and lake environments. These organism are excellent indicator species, they are easy and cheap to collect and are exposed to pollutants and environment in a variety of life cycles.*
- Nonpoint Source Pollution – *contamination or potential contamination that emanates from a diffuse source, a source that cannot be narrowed to one precise point. All "non-point" sources are voluntarily regulated in comparison to point sources that are regulated under the National and State NPDES permit program.*
- Non-Salmonid Fishes – species not of the genera ***Salmo*** *and* ***Oncorhynchus****, often criteria is designed to protect salmonids.*

- Point Source Pollution – *contamination or potential contamination that emanates from an identifiable source, such as a pipe or storm drain. All of this "point" sources are regulated under the National and State NPDES permit program.*

- Salmonid Fishes – *any species of the genera **Salmo** and **Oncorhynchus**, often criteria is designed to protect salmonids.*

- Surface Water – *Water that floats on or above the surface of the ground and may or may not be connected with water below the surface or ground water, this includes creeks, streams, rivers, conveyance structures, lakes, reservoirs, ponds and the like. All of these surface waters can be categorized into water body types for management purpose.*

- Triennial Review Process – *Federal and Colorado Clean Water Act requires that criteria, designated uses and segmentation are reviewed for each major basin in a three year rotating cycle (hence triennial review).*

Antidegradation Policy for North Dakota CWA (Section 2)

- OSWR – Outstanding State Water Resource

North Dakota Wetlands (Section 3)

- Lacustrine – Lake-like

- Palustrine – Marsh or Pond-like

- Riverine – River-like

XIX) Appendices

Appendices A through H are referenced the throughout the previous chapters of this document. Sources of the information and the associated websites are listed in chapter XX.

Appendix A
Designated Uses

2.4 River and Stream Assessment Methodology

The following is a description of the assessment methodology or decision criteria used to assess aquatic life, recreation, and drinking water uses where they are assigned to rivers and streams in the state. The methodology used to assess the fish consumption use for both rivers and lakes is provided in section 2.6.

In general, water quality assessments entered into the ADB for Section 305(b) reporting fall into two categories, evaluated and monitored. "Evaluated" assessments are those for which the use support decision was based on information other than site-specific chemical, physical, or biological monitoring data. Evaluated assessment information includes land use information, known locations of pollutant sources, spill or fish kill incidents, water quality data and/or information provided by local residents or resource managers (e.g., SCDs, WRDs, ND Game and Fish Department) for which there is no known QA/QC, and water quality monitoring data over five years old for rivers and streams and 10 years for lakes. Assessments which are extrapolated from data or assessments from adjacent AUs are also considered evaluated.

Water quality assessments defined as "monitored" are based on fixed station physical and chemical monitoring data and biological data which meet the criteria for sufficient and credible data. Only assessments based on monitoring data were used for Section 303(d) TMDL listing. Physical and chemical monitoring data used for Section 303(d) TMDL listing decisions came from two primary data sources: the USGS and the Health Department. Physical and chemical monitoring data used for these assessments included conventional pollutants (e.g., DO, pH, temperature, ammonia, fecal coliform bacteria) and toxic pollutants (e.g., trace elements and pesticides) data collected between 1997 and 2001. Biological monitoring data used for this report included fish community data collected by the department from the Red River Basin between 1993 and 1996. If more than one site occurred within a delineated AU, data from all sites and for all years was pooled for analysis.

As stated previously, use impairment for the state's rivers and streams was assessed for aquatic life, recreation, and drinking water. The following is the beneficial use decision criteria utilized for these assessments.

2.4.1 Aquatic Life

Aquatic life use, or biological integrity, can be defined as "the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitats of the region." (Karr, 1981) When aquatic life is similar to that of natural habitats in the region, it is assessed as "fully supporting." When it is not similar, it is assessed as either "fully supporting but threatened," or "not supporting," depending upon the degree of impairment. Where assessment information or data were not available, aquatic life use was considered "not assessed." Where

chemical data were available, aquatic life use support assessment decisions were made using the following decision criteria.

In general, aquatic life use determinations utilizing chemical data were based on the number of exceedences of *State Water Quality Standards* for dissolved oxygen (DO), pH, and temperature and on the number of exceedence of the acute or chronic standards for ammonia, arsenic, cadmium, copper, cyanide, lead, nickel, selenium, silver, zinc, and chromium. Where available, dissolved metals data were used to make use support decisions. Where total recoverable metals data were available, the total recoverable value was converted to a dissolved metals value using the recommended conversion factors provided in Table 1.

> Fully Supporting: For conventional pollutants, the standards of 5 milligrams per liter (mg/L) (minimum) for DO, 7.0 to 9.0 (Class I and IA streams and all lakes) and 6.0 to 9.0 (Class II and III streams) for pH, and 29.4 _C (85 _F) (maximum) for temperature were exceeded in less than 10 percent of the samples collected in the AU. For ammonia and other toxic pollutants (e.g., trace elements and organics), the acute or chronic standard was not violated at any time between 1997 and 2001.
>
> Fully Supporting, but Threatened: For DO, pH, and temperature, one or more standards were exceeded in 11 to 25 percent of the measurements taken between 1997 and 2001. For ammonia and other toxic pollutants, the acute or chronic standard was exceeded one or more times, but in less than 10 percent of the samples within any consecutive 3-year period between 1997 and 2001. Aquatic life use support was also assessed as fully supporting but threatened when land use, stream condition, or habitat were believed (using best professional judgment) to cause aquatic life to be not supporting within the next two years.
>
> Not Supporting: For DO, pH, and temperature, one or more standards were exceeded in more than 25 percent of the samples collected between 1997 and 2001. Ammonia and other toxic pollutants, the acute or chronic standard was exceeded in more than 10 percent of the samples collected between 1997 and 2001.

While chemical data provides an indirect assessment of aquatic life use impairment, direct measures of the biological community are believed to be a more accurate assessment of aquatic life use or biological integrity. The department began a stream biological monitoring and assessment program in 1993. Since then, biological monitoring has been conducted throughout the entire state.

The department has adopted the "multi-metric" index approach to assess biological integrity or aquatic life use support for rivers and streams. The multi-metric index approach assumes that various measures of the biological community (e.g., species richness, species composition, trophic structure, individual health) respond to human-induced pollutant loadings or habitat alterations. Each measure of the biological

community, termed a "metric," is evaluated and scored on a 1, 3, 5 point scale. Using this method, the higher the score, the better the biological condition and, presumably, the lower the pollutant or habitat impact.

For the department's fish community assessments, 12 metrics are used in the index with a total possible score of 60. While the department has conducted biological assessments throughout the state, it has only developed multimetric indices for fish in the Red River Basin. The following scoring criteria were used to assess aquatic life use impairment for the Red River Basin (Table 2). Multimetric fish IBIs are currently being developed for the Souris, James, and Missouri River basins and a macroinvertebrate IBI, stratified by ecoregion, is being developed based on data collected throughout the state.

Table 1. Recommended Factors for Converting Total Recoverable Metal Criteria to Dissolved Metal Criteria.

METAL	RECOMMENDED CONVERSION FACTORS	
	CMC[a]	CCC[a]
Arsenic (III)	1.000	1.000
Cadmium[b]		
Hardness = 50 mg/L	0.973	0.938
Hardness = 100 mg/L	0.944	0.909
Hardness = 200 mg/L	0.915	0.880
Chromium (III)	0.316	0.860[c]
Chromium (VI)	0.982	0.962
Copper	0.960	0.960
Lead[b]		
Hardness = 50 mg/L	0.892	0.892
Hardness = 100 mg/L	0.791	0.791
Hardness = 200 mg/L	0.690	0.690
Nickel	0.998	0.997
Selenium	0.922	0.922
Zinc	0.978	0.986

[a] CMC: Criterion Maximum Concentration
CCC: Criterion Continuous Concentration

[b] The recommended conversion factors (CFs) for any hardness can be calculated using the following equations:

Cadmium
CMC: CF = 1.136672 - [(ln hardness) (0.041838)]
CCC: CF = 1.101672 - [(ln hardness) (0.041838)]

Lead
CMC and CCC = 1.46203 - [(ln hardness) (0.145712)]

where:
(ln hardness) = natural logarithm of the hardness. The recommended CFs are given to three decimal places because they are intermediate values in the calculation of dissolved criteria.

[c] This CF applies only if the CCC is based on the test by Stevens and Chapman (1984). If the CCC is based on other chronic tests, it is likely that the CF should be 0.590, 0.376, or the average of these two values.

Source: Stephen, C. E., 1995

Table 2. Aquatic Life and Biological Integrity Scoring Criteria for Fish in the Red River Basin.

Biological Integrity	Aquatic Life Use	Fish IBI Score
Excellent	Fully Supporting	51-60
Good	Fully Supporting	41-50
Fair	Fully Supporting, but Threatened	31-40
Poor	Not Supporting	21-30
Very Poor	Not Supporting	12-20

2.4.2 Recreation

Recreation use includes swimming, boating, wading, or any recreational activity which relies on water. Recreation use in rivers and streams is considered fully supporting when there is little or no risk of illness through contact with the water. Recreation use determinations were made using fecal coliform data collected between 1997 and 2001. For each assessment based on fecal coliform data, the following criteria were used:

> Criterion 1: The geometric mean of the samples should not exceed 200 colony forming units (CFUs) per 100 milliliters (mL).
>
> Criterion 2: Not more than 10 percent of the samples should have a density exceeding 400 CFUs per 100 mL.

The two criteria were then applied using the following use support decision criteria:

> Fully Supporting: Both criteria 1 and 2 are met.
>
> Fully Supporting, but Threatened: Criteria 1 is met, but 2 is not.
>
> Not Supporting: Criteria 2 is not met and/or 1 is not met.

2.4.3 Drinking Water Supply

Drinking water is defined as "waters that are suitable for use as a source of water supply for drinking and culinary purposes, after treatment to a level approved by the Department." (*State Water Quality Standards*)

Drinking water use was assessed by comparing chemical concentration data to the human health standards for Class I, IA, and II rivers and streams. The human health standard for Class I, IA, and II rivers and streams considers two means of exposure: 1) ingestion of contaminated aquatic organisms and 2) ingestion of contaminated drinking water. Therefore, any waterbody with contaminant levels exceeding the human health standard would be considered not fully supporting its drinking water use designation.

In order to make beneficial use determinations for drinking water, the following decision criteria were used:

> Fully Supporting: For each human health contaminant, greater than 50 percent of the samples had concentrations lower than the water quality standard, and there are no drinking water complaints on record.
>
> Fully Supporting, but Threatened: For each contaminant, greater than 50 percent of the samples had concentrations lower than the standard; however, knowledge of taste and odor problems or increased treatment costs have been associated with pollutants.
>
> Not Supporting: For at least one contaminant, greater than 50 percent of the samples exceed the human health standard, and/or frequent taste and odor complaints are on record or drinking water supply closure is on record within the period 1997-2001.

Appendix B
Basic Standards and Treatment of Water Column

TABLE 1

MAXIMUM LIMITS FOR SUBSTANCES IN
OR CHARACTERISTICS OF CLASS I STREAMS

CAS No.	Substance or Characteristic	Maximum Limit
		Acute Standard
7446-41-7	Ammonia (Total as N)	The one-hour average concentration of total ammonia (expressed as N in mg/L) does not exceed, more often than once every three years on the average, the numerical value given by the following formula: $\frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$, where salmonids are absent; or $\frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$, where salmonids are present.
		Chronic Standard
		The 30-day average concentration of total ammonia (expressed as N in mg/l) does not exceed, more often than once every three years on the average, the numerical value given by the following formula; and the highest 4-day average concentration of total ammonia within the 30-day averaging period does not exceed 2.5 times the numerical value given by the following formula: $= \frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \cdot CV$; where CV = 2.85, when T • •14• •C; or $CV = 1.45 \cdot 10^{0.028\cdot(25-T)}$, when T > 14 • •C.

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CAS No.	Substance or Characteristic	Maximum Limit
		Site-Specific Chronic Standard
		The following site-specific standard applies to the Red River of the North beginning at the 12th Avenue North bridge in Fargo, North Dakota and extending approximately 32 miles downstream to its confluence with the Buffalo River, Minnesota. This site-specific standard applies only during the months of October, November, December, January, and February. During the months of March through September, the statewide chronic ammonia standard applies.
		The 30-day average concentration of total ammonia (expressed as N in mg/L) does not exceed, more often than once every three years on the average, the numerical value given by the following formula; and the highest 4-day average concentration of total ammonia within the 30-day averaging period does not exceed 2.5 times the numerical value given by the following formula:
		$= \left(\frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} \right) \cdot CV$;
		where CV = 4.63, when T ≤ 7°C; or
		$CV = 1.45 \cdot 10^{0.028 \cdot (25-T)}$, when T > 7°C.
7440-39-3	Barium (Total)	1.0 mg/l
	Boron (Total)	.75 mg/l
16887-00-6	Chlorides (Total)	100 mg/l
7.782-50-5	Chlorine Residual (Total)	Acute .019 mg/l Chronic .011 mg/l
7782-44-7	Dissolved Oxygen	not less than 5 mg/l
	Fecal Coliform	200 fecal coliforms per 100 ml. This standard shall apply only during the recreation season May 1 to September 30.
14797-55-8	Nitrates (N) (Diss.)[1]	1.0 mg/l
	pH	7.0-9.0

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CAS No.	Substance or Characteristic	Maximum Limit
32730	Phenols (Total)	0.3 mg/l (organoleptic criterion)
7723-14-0	Phosphorus (P) (Total)[1]	0.1 mg/l
	Sodium	50 percent of total cations as mEq/l
	Sulfates (Total as SO_4)	250 mg/l
	Temperature	Eighty-five degrees Fahrenheit [29.44 degrees Celsius]. The maximum increase shall not be greater than five degrees Fahrenheit [2.78 degrees Celsius] above natural background conditions.
	Combined radium 226 and radium 228 (Total)	5 pCi/L
	Gross alpha particle activity, including radium 226, but excluding radon and uranium	15 pCi/L

[1] The standards for nitrates (N) and phosphorus (P) are intended as interim guideline limits. Since each stream or lake has unique characteristics which determine the levels of these constituents that will cause excessive plant growth (eutrophication), the department reserves the right to review these standards after additional study and to set specific limitations on any waters of the state. However, in no case shall the standard for nitrates (N) exceed 10 mg/l for any waters used as a municipal or domestic drinking water supply.

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TABLE 2

WATER QUALITY CRITERIA[1]
PRIORITY POLLUTANTS (MICROGRAMS PER LITER)

CAS No.	Pollutant	Aquatic Life Value Classes I,IA,II,III Acute	Chronic	Human Health Value Classes I,IA,II[2]	Class III[3]
83-32-9	Acenaphthene			1200	2700
107-02-8	Acrolein			320	780
107-13-1	Acrylonitrile[4]			0.059	0.66
71-43-2	Benzene[4]			1.2	71
92-87-5	Benzidine[4]			0.00012	0.00054
56-23-5	Carbon tetrachloride[4] (Tetrachloromethane)			0.25	4.4
108-90-7	Chlorobenzene (Monochlorobenzene)			100	21000
120-82-1	1,2,4-Trichlorobenzene			70[7]	940
118-74-1	Hexachlorobenzene[4]			0.00075	0.00077
107-06-2	1,2-Dichloroethane[4]			0.38	99
71-55-6	1,1,1-Trichloroethane			200	
67-72-1	Hexachloroethane[4]			1.9	8.9
79-00-5	1,1,2-Trichloroethane[4]			0.61	42.0
79-34-5	1,1,2,2-Tetrachloroethane[4]			0.17	11.0
111-44-4	Bis(2-chloroethyl) ether[4]			0.031	1.40
91-58-7	2-Chloronaphthalene			1700	4300
88-06-2	2,4,6-Trichlorophenol[4]			2.1	6.5
59-50-7	p-Chloro-m-cresol (4-Chloro-3-methylphenol)			3000	
67-66-3	Chloroform (HM)[4] (Trichloromethane)			5.7	470
95-57-8	2-Chlorophenol			120	400
95-50-1	1,2-Dichlorobenzene[7]			600	17000
541-73-1	1,3-Dichlorobenzene			400	2600
106-46-7	1,4-Dichlorobenzene[7]			75	2600
91-94-1	3,3'-Dichlorobenzidine[4]			0.039	0.077
75-35-4	1,1-Dichloroethylene[4]			0.057	3.2
156-60-5	1,2-trans-Dichloroethylene[7]			100	140000
120-83-2	2,4-Dichlorophenol			93	790
542-75-6	1,3-Dichloropropylene (1,3-Dichloropropene) (cis and trans isomers)			10	1700
78-87-5	1,2-Dichloropropane			.52	39
105-67-9	2,4-Dimethylphenol			540	2300
121-14-2	2,4-Dinitrotoluene[4]			0.11	9.1
122-66-7	1,2-Diphenylhydrazine[4]			0.040	0.54
160-41-4	Ethylbenzene[7]			700	29000
206-44-0	Fluoranthene			300	370
39638-32-9	Bis(2-chloroisopropyl) ether			1400	170000
75-09-2	Methylene chloride (HM)[4] (Dichloromethane)			4.7	1600
74-83-9	Methyl bromide (HM) (Bromomethane)			48	4000

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CAS No.	Pollutant	Aquatic Life Value Classes I,IA,II,III Acute	Chronic	Human Health Value Classes I,IA,II[2]	Class III[3]
75-25-2	Bromoform (HM)[5] (Tribromomethane)			4.3	360
75-27-4	Dichlorobromomethane (HM)[5]			0.56	46
124-48-1	Chlorodibromomethane (HM)[5]			0.41	34
87-68-3	Hexachlorobutadiene[4]			0.44	50
77-47-4	Hexachlorocyclopentadiene			50[7]	17000
78-59-1	Isophorone[4]			36	2600
98-95-3	Nitrobenzene			17	1900
51-28-5	2,4-Dinitrophenol			70	14000
534-52-1	4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)			13	765
62-75-9	N-Nitrosodimethylamine[4]			0.00069	8.1
86-30-6	N-Nitrosodiphenylamine[4]			5.0	16
621-64-7	N-Nitrosodi-n-propylamine[4]			0.005	1.4
87-86-5	Pentachlorophenol	19	15	0.28	8.2
108-95-2	Phenol			21000	4600000
117-81-7	Bis(2-ethylhexyl)phthalate[4]			1.8	5.9
85-68-7	Butyl benzyl phthalate			3000	5200
84-74-2	Di-n-butyl phthlate			2700	12000
84-66-2	Diethyl phthalate			23000	120000
131-11-3	Dimethyl phthlate			313000	2900000
56-55-3	Benzo(a)anthracene (PAH)[4] (1,2-Benzanthracene)			0.0044	0.049
50-32-8	Benzo(a)pyrene (PAH)[4] (3,4-Benzopyrene)			0.0044	0.049
205-99-2	Benzo(b)fluoranthene (PAH)[4] (3,4-Benzofluoranthene)			0.0044	0.049
207-08-9	Benzo(k)fluoranthene (PAH)[4] (11,12-Benzofluoranthene)			0.0044	0.049
218-01-9	Chrysene (PAH)[4]			0.0044	0.049
120-12-7	Anthracene (PAH)[5]			9600	110000
86-73-7	Fluorene (PAH)[5]			1300	14000
53-70-1	Dibenzo(a,h)anthracene (PAH)[4] (1,2,5,6-Dibenzanthracene)			0.0044	0.049
193-39-5	Indeno(1,2,3-cd)pyrene (PAH)[4]			0.0044	0.049
129-00-0	Pyrene (PAH)[5]			960	11000
127-18-4	Tetrachloroethylene[4]			0.8	8.9
108-88-3	Toluene			10007	200000
79-01-6	Trichloroethylene[4]			2.7	81
75-01-4	Vinyl chloride[4] (Cloroethylene)			2	530
309-00-2	Aldrin[4]	1.5		0.00013	0.00014
60-57-1	Dieldrin[4]	1.25	0.56	0.00014	0.00014
57-74-9	Chlordane[4]	1.2	0.0043	0.0021	0.0022
80-29-3	4,4'-DDT[4]	0.55	0.001	0.00059	0.00059
75-55-9	4,4'-DDE[4]			0.00059	0.00059
72-54-8	4,4'-DDD[4]			0.00083	0.00084
115-29-7	alpha-Endosulfan	0.11	0.056	110	240
115-29-7	beta-Endosulfan	0.11	0.05	110	240
1031-07-8	Endosulfan sulfate			110	240
72-20-8	Endrin	0.09	0.036	0.76	0.81
7421-93-4	Endrin aldehyde			0.76	0.81
76-44-8	Heptachlor[4]	0.26	0.0038	0.00021	0.00021
1024-57-3	Heptachlor epoxide[4]	0.26	0.0038	0.00010	0.00011

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Appendix C
Stream and Waterbody Segmentation / Classification

APPENDIX I

STREAM CLASSIFICATIONS

The following intrastate and interstate streams are classified as the class of water quality which is to be maintained in the specified stream or segments noted. There are a number of minor or intermittently flowing watercourses, unnamed creeks, or draws, etc., which are not listed. All tributaries not specifically mentioned are classified as class III streams.

RIVER BASINS, SUBBASINS, AND TRIBUTARIES	CLASSIFICATION
Missouri River, including Lake Sakakawea and Oahe Reservoir	I
Yellowstone	I
Little Muddy Creek near Williston	II
White Earth River	II
Little Missouri River	II
Knife River	II
Spring Creek	IA
Square Butte Creek below Nelson Lake	IA
Heart River	IA
Green River	IA
Antelope Creek	II
Muddy Creek	II
Apple Creek	I
Cannonball River	I
Cedar Creek	II
Beaver Creek near Linton	II
Grand River	IA
Spring Creek	II
Souris River	IA
Des Lacs River	II
Willow Creek	II
Deep River	III
Mauvais Coulee	I
James River	IA
Pipestem	IA
Cottonwood Creek	II

Beaver Creek	II
Elm River	II
Maple River	II
Bois de Sioux	I
Red River	I
Wild Rice River	II
Antelope Creek	III
Sheyenne River	IA
Baldhill Creek	II
Maple River	II
Rush River	III
Elm River	II
Goose River	IA
Turtle River	II
Forest River	II
North Branch	III
Park River	II
North Branch	III
South Branch	II
Middle Branch	III
Cart Creek	III
Pembina River	IA
Tongue River	II

APPENDIX II

LAKE CLASSIFICATION

Lakes are classified according to the water characteristics which are to be maintained in the specified lakes. The beneficial water uses and parameter limitations designated for class I streams shall apply to all classified lakes.

COUNTY	LAKE	CLASSIFICATION
Adams	Mirror	3
Adams	N. Lemmon	1
Barnes	Ashtabula	3
Barnes	Heinze	3

Barnes	Moon	2
Barnes	Clausen Spring	1
Benson	Wood Lake	2
Benson	Graves	3
Benson	Reeves	3
Bottineau	Metigoshe	2
Bottineau	Long Lake	2
Bottineau	Pelican	3
Bottineau	Carbury	2
Bottineau	Cassidy	3
Bottineau	Strawberry	2
Bowman	Bowman-Haley	3
Bowman	Gascoyne	3
Bowman	Kalina	3
Bowman	Spring Lake	3
Burke	Powers Lake	3

Appendix D
Treatment of Sediment
(not available)

Appendix E
Treatment of Biological

NORTH DAKOTA

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NDHD Division of Water Quality homepage: http://www.health.state.nd.us/ndhd/environ/wq/

Program Description

The primary goal of North Dakota's biological monitoring and assessment program is to develop a set of scientifically defensible ecological indicators that can be used to assess the extent to which the state's rivers and streams are meeting their designated aquatic life uses. Once developed, these indicators can also be used to set restoration goals when developing total maximum daily loads (TMDLs) and/or Section 319 nonpoint source pollution project implementation plans.

The North Dakota Department of Health (NDHD) initiated its biological monitoring and assessment program in 1993 and 1994 as part of an interagency project to develop a multimetric index of biological integrity (IBI) for fish in the Lake Agassiz Plain ecoregion, Red River of the North Basin. In addition to the Department of Health, other agencies involved in the project were the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, EPA Region V, and the USGS – Red River National Water Quality Assessment (NAWQA) project team. The project resulted in a 12 metric IBI for fish which distinguished among headwater, moderate, and large sized rivers.

Since 1995, NDHD has conducted biological monitoring in each of the state's four major river basins. The Department's biological monitoring and assessment efforts continued in the Red River of the North Basin in 1995 and 1996. In addition to fish, the Department began sampling macroinvertebrates in 1995. In 1997 and 1998, monitoring and assessment efforts were expanded to the Souris River and James River basins, respectively, and in 1999 and 2000 the Department sampled the Missouri River Basin. In addition to fish and macroinvertebrate samples collected at each site, NDHD also conducted a habitat assessment following EPA's Rapid Bioassessment Protocol.

Preliminary multimetric IBIs have been developed for fish and macroinvertebrates in the Red River Basin and for fish in the Souris River Basin. These IBIs have been used to assess aquatic life use support for the 2000 Section 305(b) report. As these IBIs are refined and as additional IBIs are developed for the remaining river basins, it is the Department's intent to include these biological assessments in future Section 305(b) reports as well as in the development of Section 303(d) TMDL lists.

NDHD is currently collaborating with North Dakota State University and EPA Region VIII in a two year pilot project to evaluate the response of the benthic periphyton community to varying summer growing season nutrient levels with the goal of developing regional nutrient criteria. Based on the results of this pilot project, NDHD may include periphyton in future biological monitoring and assessment activities, especially in relation to nutrient enrichment and eutrophication.

The Department is also a collaborator with EPA in the EMAP Western Pilot Project. The EMAP Western Pilot is currently in the third year of a four year project. By collaborating in this 12 state project, the Department hopes to integrate EMAP sampling design as well as EMAP sampling protocols into future biological monitoring and assessment projects. When NDHD's commitment to this project is completed in 2004, it's the Department's plan to begin its rotating basin monitoring program with the Red River Basin.

Documentation and Further Information

North Dakota Water Quality Assessment 1998 - 1999, 2000 305(b) Report:
http://www.health.state.nd.us/ndhd/environ/wq/2000_305b/2000_305b.pdf

For links to numerous NDHD surface water quality/management publications, including *Standards of Quality for Waters of the State, Chapter 33-16-02* and *North Dakota Unified Watershed Assessment, FY1999*, go to:
http://www.health.state.nd.us/ndhd/environ/wq/

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NORTH DAKOTA

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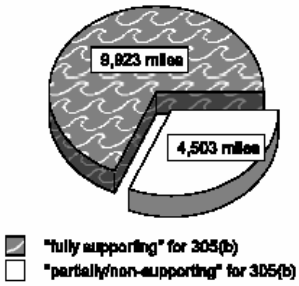
Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
	✓	promulgated into state water quality standards as biocriteria
		support of antidegradation
		evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
		other:
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(special projects only)*
		fixed station (i.e., water quality monitoring stations)
		probabilistic by stream order/catchment area
		probabilistic by ecoregion, or statewide
	✓	rotating basin *(specific river basins or watersheds)*
		other:

Stream Miles

Total miles *(determined using RF3)*	**54,427**
Total perennial miles	unknown
Total miles assessed for biology*	**14,426**
fully supporting for 305(b)	9,923
partially/non-supporting for 305(b)	4,503
listed for 303(d)	–
number of sites sampled *(on an annual basis)***	150
number of miles assessed per site	–

14,426 Miles Assessed for Biology



*Both stream and river miles were assessed for biological, chemical and physical effects. As reported in ND's 2000 305(b) report, approximately 68.8 percent (9,923 miles) of rivers and streams assessed for this report fully support the beneficial use designated as aquatic life. The remaining 31.2 percent of rivers and streams (4,503 miles) either partially supporting or did not support their aquatic life uses.

**According to ND's 2000 305(b) report, "In 1997, 1998, and 1999, the department focused its intensive basin survey efforts on the Souris River Basin, the James River Basin, and the Lake Sakakawea subbasin, respectively. In addition to chemical monitoring, biological monitoring was conducted at approximately 50 sites in each basin each year."

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Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Single Aquatic Life Use	
ALU designations in state water quality standards	North Dakota has several classes described (Class I, Ia, II, and III) but the ALU is basically the same for all classes.	
Narrative Biocriteria in WQS	A narrative biological goal is contained in ND's water quality standards. There are no formal/informal numeric procedures used to support narrative biocriteria.	
Numeric Biocriteria in WQS	none	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
	✓	cause and effect determinations
		permitted discharges
		monitoring (e.g., improvements after mitigation)
	✓	watershed based management
Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	Nonpoint source project implementation plans	

Reference Site/Condition Development

Number of reference sites	**~75 total**	
Reference site determinations		site-specific
		paired watersheds
	✓	regional (aggregate of sites)
		professional judgment
		other:
Reference site criteria	Reference sites are the best sites of the whole population sampled, determined by habitat condition of sites and fish IBI.	
Characterization of reference sites within a regional context		historical conditions
	✓	least disturbed sites
		gradient response
		professional judgment
		other:
Stream stratification within regional reference conditions	✓	ecoregions (or some aggregate)
		elevation
	✓	stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
	✓	other: river basin
Additional information		reference sites linked to ALU
		reference sites/condition referenced in water quality standards
	✓	some reference sites represent acceptable human-induced conditions

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Field and Lab Methods

Assemblages assessed	✓	benthos *(100 - 500 samples/year; single season, multiple sites - watershed level)*
	✓	fish *(<100 samples/year; single season, multiple sites - watershed level)*
	✓	periphyton *(<100 samples/year; multiple seasons, multiple sites - broad coverage for watershed level)*
		other:
Benthos		
sampling gear		D-frame; 500-600 micron mesh
habitat selection		multihabitat
subsample size		300 count
taxonomy		lowest practical, usually genus
Fish		
sampling gear		boat and longline electrofishers, pram unit (tote barge)
habitat selection		multihabitat
sample processing		length measurement, biomass - batch, anomalies
subsample		none
taxonomy		species
Periphyton		
sampling gear		**natural substrate**: suction device
habitat selection		riffle/run (cobble)
sample processing		taxonomic identification
taxonomy		diatoms only
Habitat assessments		visual based and hydrogeomorphology; performed with bioassessments
Quality assurance program elements		standard operating procedures, quality assurance plan and specimen archival

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
		parametric ANOVAs
		multivariate analysis
	✓	biological metrics *(multimetric index under development)*
	✓	disturbance gradients
		other:
Multimetric thresholds		
transforming metrics into unitless scores		95th percentile of all sites
defining impairment in a multimetric index		"power analysis"
Evaluation of performance characteristics	✓	repeat sampling *(replicate sampling within and among years)*
		precision
		sensitivity
		bias
		accuracy
Biological data		
Storage		Fish and habitat assessment data are in an MS Access 97 database maintained by the Department. Macroinvertebrate data are in EDAS.
Retrieval and analysis		Macroinvertebrate data are analyzed by EDAS, and plots generated by SAS. Fish data are analyzed with queries developed in-house.

Appendix F
Naming Conventions
(not available)

Appendix G
303(d) example

Table VI-1. 2004 List of Section 303(d) TMDL Waters for the Souris River Basin in North Dakota

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09010001-001-L_00	Short Creek Dam	96.3 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	1B
					Oxygen, Dissolved	1B
					Sedimentation/Siltation	1B
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1B
ND-09010001-001-S_00	Souris River from the ND-Saskatchewan border downstream to Lake Darling	43.4 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	1B
					Oxygen, Dissolved	1B
					Metals	1B
					Sedimentation/Siltation	1B
			Recreation	Fully Supporting but Threatened	Total Fecal Coliform	1B
ND-09010001-002-S_01	Long Creek mainstem	25 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-09010001-006-S_00	Souris River from Lake Darling downstream to its confluence with the Des Lacs River	30.2 miles	Fish and Other Aquatic Biota	Not Supporting	Biological Indicators	2
ND-09010002-002-L_00	Northgate Dam	150.8 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
					Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1A

Table VI-1. 2004 List of Section 303(d) TMDL Waters for the Souris River Basin in North Dakota (cont.)

Assessment Unit ID	AU Description	AU Size	Designated Use	Use Support	Impairment	TMDL Priority[1]
ND-09010003-001-L_00	Carbury Dam	130 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	1A
					Sedimentation/Siltation	1A
			Recreation	Fully Supporting but Threatened	Nutrients/Eutrophication	1A
ND-09010003-001-S_00	Souris River from its confluence with Oak Creek downstream to its confluence with the Wintering River	51.7 miles	Fish and Other Aquatic Biota	Fully Supporting bu Threatened	Sedimentation/Siltation	2
ND-09010003-003-S_00	Wintering River, including tributaries	195.9 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	2
					Sedimentation, Siltation	2
			Recreation	Not Supporting	Total Fecal Coliform	2
ND-09010003-005-S_00	Souris River from its confluence with the Wintering River downstream to its confluence with Willow Creek	76.2 miles	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Oxygen, Dissolved	2
					Sedimentation/Siltation	2
ND-09010003-009-S_00	Boundary Creek, including tributaries	143.8 miles	Recreation	Not Supporting	Total Fecal Coliform	2
ND-09010004-001-S_00	Willow Creek from its confluence with Ox Creek downstream to its confluence with the Souris River	39.4 miles	Recreation	Fully Supporting but Threatened	Total Fecal Coliform	2
ND-09010004-002-L_00	Long Lake	287 acres	Fish and Other Aquatic Biota	Fully Supporting but Threatened	Nutrients/Eutrophication	2
					Oxygen, Dissolved	2

[1] Priority 1A are those AUs for which TMDLs are scheduled for completion in the next two years. Priority 1B are AUs for which TMDL development activities (e.g., monitoring or modeling) are scheduled to begin in the next two years. Priority 2 are those AUs which are scheduled for TMDL development in the next 10 years. AUs listed as Priority 3 are listed as impaired for fish consumption due to methyl-mercury. These AUs are a low priority for the state due to complexities related to the fate and transport of methyl-mercury and due to the interstate and international nature of atmospheric mercury sources. It is the department's recommendation that EPA take the lead in developing mercury TMDLs.

Appendix H
Assessment Protocols for Listing and Delisting

PART VI. SECTION 303(d) LIST OF WATER QUALITY-LIMITED WATERS NEEDING TMDLs

A. Background

Section 303(d) of the CWA and its accompanying regulations (CFR Part 130 Section 7) require each state to list waterbodies (i.e., lakes, reservoirs, rivers, streams and wetlands) that are considered water quality-limited and require load allocations, waste load allocations, and TMDLs. This list has become known as the "TMDL list" or "Section 303(d) list."

A waterbody is considered water quality limited when it is known that its water quality does not or is not expected to meet applicable standards. Waterbodies can be water quality limited due to point source pollution, NPS pollution or both.

In considering whether or not applicable water quality standards are being met, the state should consider not only the narrative and numeric criteria set forth in the standards to protect specific uses, but also the classified uses defined for the waterbody and whether the use or uses are fully supported or not supported due to any pollutant source or cause. Therefore, a waterbody could be considered water quality limited when it can be demonstrated that a beneficial use (e.g., aquatic life or recreation) is impaired, even when there are no demonstrated exceedences of either the narrative or numeric criteria. In cases where there is use impairment but no exceedence of the numeric standard, the state should provide information as to the cause of the impairment. Where the specific pollutant (e.g., copper or phosphorus) is unknown, a general cause category (e.g., metals or nutrients) should be included with the waterbody listing.

Section 303(d) and accompanying EPA regulations and policy require only impaired and threatened waterbodies to be listed, and TMDLs developed, when the source of impairment is a pollutant. Pollution, by federal and state definition, is "any man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of water." Based on the definition of a pollutant provided in Section 502(6) of the CWA and in 40 CFR 130.2(d), pollutants would include temperature, ammonia, chlorine, organic compounds, pesticides, trace elements, nutrients, biochemical oxygen demand (BOD), sediment and pathogens. Waterbodies impaired by habitat and flow alteration and the introduction of exotic species would not be included in the Section 303(d) TMDL list, as these impairment categories would be considered pollution and not pollutants. In other words all pollutants are pollution, but not all pollution is a pollutant.

Where a waterbody is water quality limited, the state is required to determine, in a reasonable time frame, the reduction in pollutant loading necessary for that waterbody to meet water quality standards, including its beneficial uses. The process by which the pollutant-loading capacity of a waterbody is determined and the load is allocated to point and nonpoint sources is called a total maximum daily load or TMDL. While the term TMDL implies that loading capacity is determined on a daily time scale, TMDLs can

range from meeting an instantaneous concentration (i.e., an acute standard) to computing an acceptable annual phosphorus load for a lake or reservoir.

Section 303(d) requires states to submit their lists of water quality-limited waterbodies "from time to time." Federal regulations have clarified this language; therefore, beginning in 1992 and by April 1 of every even-numbered year thereafter, states are required to submit a revised list of waters needing TMDLs. North Dakota's 2002 TMDL list was submitted to EPA in March 2003 and was approved in April 2003. This 2004 Section 303(d) list includes waterbodies not meeting water quality standards, waterbodies needing TMDLs, and waterbodies that have been removed from the 2002 list. Reasons for removing a waterbody from the 2002 list include (1) a TMDL has been completed for the waterbody and approved by EPA; (2) current data and/or information suggests the waterbody is now meeting water quality standards; (3) data and/or information used to list the waterbody as water quality limited has been determined to be insufficient and/or of poor quality; (4) the assessment was made based on best professional judgment; (5) the cause of the use impairment was related to a pollutant for which there is not clearly defined or scientifically defensible chemical criteria (e.g., nutrients); or (6) the water quality impairment is not due to a pollutant.

This listing report also corrects inconsistencies between the 1998 list and the 2002 list raised by EPA. Many of these inconsistencies were resolved by re-listing the waterbody in 2004 for the pollutant of concern originally listed in 1998. In other cases, the 1998 waterbody and the pollutant of concern have been included in the 2004 list of waterbodies to be de-listed. If a waterbody is included in the de-listed waterbodies, further clarification has been provided in the rationale for de-listing.

Along with the TMDL list, states are required to provide documentation to the EPA Regional Administrator in support of the state's decision to list or not list waterbodies. Information supporting North Dakota's 2004 TMDL list is provided in Part IV "Assessment Methodology." At a minimum, a state's supporting information should include (1) a description of the methodology used to develop the list; (2) a description of the data and information used to develop the list; (3) the rationale for any decision to not use this information; (4) the rationale for removing waterbodies previously listed as water quality limited; and (5) a summary of comments received on the list during the state's public comment period.

Following an opportunity for public comment, the state must submit its list to the EPA Regional Administrator. The EPA Regional Administrator then has 30 days to either approve or reject the state listings. If the EPA Regional Administrator rejects a state submittal, EPA then has 30 days to develop a list for the state. This list also is required to undergo public comment prior to finalization.

B. Prioritization of TMDL Listed Waters

When a state prepares its list of water quality-limited waterbodies, it is required to prioritize waterbodies for TMDL development and to identify those waterbodies that will

be targeted for TMDL development within the next two years. Factors to be considered when prioritizing waterbodies for TMDL development include (1) the severity of pollution and the uses which are impaired; (2) the degree of public interest or support for the TMDL, including the likelihood of implementation of the TMDL; (3) recreational, aesthetic and economic importance of the waterbody; (4) the vulnerability or fragility of a particular waterbody as an aquatic habitat, including the presence of threatened or endangered species; (5) immediate programmatic needs, such as wasteload allocations needed for permit decisions or load allocations for Section 319 NPS project implementation plans; and (6) national policies and priorities identified by EPA.

After considering each of the six factors, the state has developed a three-tiered priority ranking. AUs listed as Priority 1 have been further categorized. Priority 1A are lakes and reservoirs and river and stream segments for which TMDLs are scheduled to be completed and submitted to EPA in the next two years. Priority 1B are lakes and reservoirs and river and stream segments for which TMDL development projects are scheduled to be started in the next two years. The majority of these Priority 1A and 1B AUs were identified as such based largely on their degree of public support and interest and the likelihood of implementation of the TMDL once completed. Priority 2 AUs are those river and stream segments and lakes and reservoirs that are scheduled for completion in the next 10 years.

Waterbodies for which fish consumption use is impaired due to methyl-mercury are considered Priority 3. These AUs are a low priority for TMDL development in the state. TMDL development for methyl-mercury-contaminated waterbodies is complicated by several factors, including: (1) uncertainty regarding the fate and transport of atmospheric sources of mercury; and (2) the complexity of the biological and geochemical interactions that affect the conversion of elemental mercury to methyl-mercury and its bioaccumulation rate in fish. Due to these complexities and the interstate and international nature of atmospheric mercury sources, it is the department's recommendation that EPA take the lead in developing mercury TMDLs.

C. Public Participation Process

Public comment was solicited on the draft 2004 TMDL list through a public notice published on March 25 and 29, 2004, in the daily newspapers located in Fargo, Grand Forks, Bismarck, Minot, Dickinson and Williston (Appendix F). The public notice encouraged interested parties to obtain a copy of the draft TMDL list by contacting the department in writing, by phone, or by accessing the list through the department's website at www.health.state.nd.

Comment on the draft TMDL list also was requested through mail or email from individuals and specific agencies and organizations. These included the South Dakota Department of Environment and Natural Resources, Minnesota Pollution Control Agency (Detroit Lakes Regional Office), the Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, the U.S. Forest Service, the North Dakota Game and Fish

Department, the State Water Commission, the Red River Basin Commission, individuals on the State Water Pollution Advisory Board, and EPA Region VIII. Comments were received only from EPA Region VIII. These comments and the department's response are provided in Appendix G. Where appropriate, these comments have been incorporated in this final 2004 Integrated Report.

D. Listing of Impaired Waters Needing TMDLs

As stated previously, for 2004 Section 305(b) reporting and Section 303(d) TMDL listing states were encouraged to follow the "Integrated Reporting Guidance"(EPA, 2003). This guidance suggests that states place their assessed waterbodies into one of five assessment categories (Table IV-1). Waterbodies (also referred to as AUs) assessed as Category 5 form the basis of the state's Section 303(d) TMDL list. Tables VI-1, VI-2, VI-3 and VI-4 provide a list of AUs in the Souris, Red, Missouri and James river basins respectively that are impaired and in need of TMDLs (i.e., Category 5). These impaired waters also are depicted graphically for the Souris River Basin

(Figure VI-1), the Upper and Lower Red River basins (Figures VI-2 and VI-3), the Lake Sakakawea and Lake Oahe sub-basins of the Missouri River Basin (Figures VI-4 and VI-5), and the James River Basin (Figure VI-6). The 2004 TMDL list is represented by 211 AUs (47 lakes and reservoirs and 164 river and stream segments) and 363 individual waterbody-pollutant combinations. For purposes of TMDL development, each waterbody-pollutant combination requires a TMDL.

While not specifically assessed for purposes of this report, the biotic community functions of isolated wetlands in the state currently are considered vulnerable to loss from filling and drainage and to contamination from chemical pollutants. For example, the department considers wetlands in the Lostwood National Wildlife Refuge and Wilderness Area to be particularly vulnerable to methyl-mercury contamination from nearby coal-fired power plants, which is exacerbated by the natural water level fluctuations and the burning of adjacent uplands. Assuming financial resources are available, this risk of contamination should be assessed through additional monitoring.

E. De-listing of 2002 Listed TMDL Waters

Table VI-5 provides a list of lakes, reservoirs, rivers and streams that were listed in the previous 2002 TMDL list but that have been removed from this year's Section 303(d) list submittal. Table VI-5 also contains further clarification for waterbodies listed in the 1998 TMDL list that were de-listed in 2002. AUs were removed from the TMDL list for a number of reasons. The following are the primary reasons for de-listing an AU:

- Based on most recent data, use is fully supported.
- Use impairment is due to a nonpollutant (habitat).
- Sufficient credible data and/or information is lacking to make a use support determination.

In most cases, when the original assessment was judged not to be representative of current water quality conditions due to a lack of sufficient credible data, one of the following usually occurred:

- The data used to conduct the assessment are now more than 10 years old for rivers and streams and 12 years old for lakes and reservoirs, and based on best professional judgment, the assessment is no longer believed to be valid. This would occur if it is believed that water quality has been altered due to significant changes in land use and/or due to climatic changes.
- The original assessment was based only on best professional judgment.
- The original assessment was based on data extrapolated from a monitoring station(s) located in an adjacent AU.

River and stream AUs listed during the last cycle as threatened or impaired due to nutrients also were de-listed. These AUs will remain off the TMDL list until scientifically defensible nutrient criteria are developed.

XX) Appendices Map

Main Website - http://www.health.state.nd.us/wq/sw/A_Publications.htm

Appendix A – Found in the North Dakota 2002 Section 303(d) List of Waters Needing Total Maximum Daily Loads at
http://www.health.state.nd.us/wq/sw/z7Publications/303(d)Lists/TMDL_2002.pdf
See pages 10 - 15

Appendix B – Found in the Chapter 33-16-02.1 Standards of Quality for Waters of the State at http://www.health.state.nd.us/wq/sw/Z7_Publications/B_NDCC_WQS.pdf
See pages 8 - 13

Appendix C – Found in the Chapter 33-16-02.1 Standards of Quality for Waters of the State at http://www.health.state.nd.us/wq/sw/Z7_Publications/B_NDCC_WQS.pdf
See pages 21-23

Appendix D – not available

Appendix E – Found on a PDF created by the EPA entitled "Summary of Bioassessment Programs and Biocriteria Development" – Dec. 2002.
http://www.epa.gov/bioindicators/pdf/ND_summary_final.pdf

Appendix F – not available

Appendix G – Found in Part IV of the 2004 Integrated Report
http://www.health.state.nd.us/wq/sw/Z7_Publications/303(d)Lists/TMDL_2004_IntegratedReport_Final.pdf
Examples from pages VI-5 – VI-6

Appendix H – Found in Part IV of the 2004 Integrated Report
http://www.health.state.nd.us/wq/sw/Z7_Publications/303(d)Lists/TMDL_2004_IntegratedReport_Final.pdf
See pages VI-1 – VI-4

The Clean Water Act: SOUTH DAKOTA

I) DENR and State Review Process

The Department of Environment and Natural Resources (DENR) maintains an extensive surface water quality monitoring network at many of South Dakota's streams. There are currently 134 active ambient monitoring stations across the state. The data from these sampling stations helps the Department identify problems, document improvements and demonstrate overall trends in the quality of South Dakota waters. For a list of the station names, waterbodies, counties, locations, lat/long, frequency of sampling, and date sampling began see http://www.state.sd.us/denr/DES/Surfacewater/WQMList.htm

Triennial Review:

The DENR includes extensive public participation across the state seeking public input when going through its watershed standard review process. This is also the case in compiling its lists of use-impaired waters for the EPA required 303(d) list. Requests are made for data statewide and public participation and awareness is promoted via the SD DENR website. Following is the public review process, exampled by development of the 2002 303(d) list.

First Public Review/Input Period

On or around August 1, 2001, an ad was published in 11 statewide daily newspapers and Indian Country Today, announcing the DENR was developing the 2002 303(d) list and requesting water quality data that would aid in the identification of waters that should be added, removed, or remain on the list. This announcement was also sent to approximately 70 individuals and organizations.

Second Public Review Period

Data received after the first public review period, and additional data gathered by DENR were reviewed, and a draft list was developed. The draft list was released for a 30-day public review and comment period in late July 2002. The announcement on the availability of the draft list was again published in the 11 daily newspapers and Indian Country Today. The draft list was also made available on DENR's web page at: **http://www.state.sd.us/denr/denr.html.** At this time, the draft list was also provided to USEPA Region VIII for review and comment. Personnel from DENR responded to inquiries and were available to meet with interested groups about the list and listing process.

II) Contacts

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To get on an agency's mailing list for:

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III) List of Designated Uses

Beneficial use classifications of surface waters of the state have been established in the Administrative Rules of South Dakota, Chapter 74:51. The classifications designate the minimum water quality at which surface waters are to be maintained and protected. The following are the beneficial use classifications:

1) Domestic water supply waters;
2) Coldwater permanent fish life propagation waters;
3) Coldwater marginal fish life propagation waters;
4) Warmwater permanent fish life propagation waters;
5) Warmwater semipermanent fish life propagation waters;
6) Warmwater marginal fish life propagation waters;
7) Immersion recreation waters;
8) Limited contact recreation waters;
9) Wildlife propagation and stock watering waters;
10) Irrigation waters; and
11) Commerce and industry waters.

For the criteria for evaluating water quality data for designated uses see Appendix A, Table 4.

IV) Water Quality Classified Uses and Antidegradation Policy

For South Dakota's Antidegradation Policy see the document entitled "Antidegradation Policies by State."

V) Basic Standards/Criteria

Application of chronic/acute criteria:

1) Compliance with the chronic criteria or criteria continuous concentration (CCC) is based on the results of a 30-day average. Compliance with CCC in a surface water discharge permit may be based on grab or composite samples;

2) Compliance with the acute criteria or criteria maximum concentration (CMC) is based on the results of any one grab sample. However, compliance with CMC in a surface water discharge permit may be based on a composite sample.

A water quality standard defines the water quality goals of a water body, or a portion of the water body. The water quality standards regulations establish the use or uses to be made of a water body, set criteria necessary to protect the uses, and establish policies to maintain and protect water quality. South Dakota has developed surface water quality standards for all waters of the state, as required by the Clean Water Act. South Dakota's water quality standards are designed to protect public health and welfare, enhance the quality of water, and uphold the goals of the federal Clean Water Act.

The Administrative Rules of South Dakota (ARSD 74:51:01, :02, and :03) contain South Dakota's surface water quality standards. Chapter 74:51:01 contains both the numeric and narrative criteria to protect the uses of the state's water bodies. Chapters 74:51:02 and 74:51:03 designate the beneficial uses assigned to each specific water body in the state.

The narrative and numeric criteria for each designated use are described in detail in the water quality standards. Such criteria are listed in the standards for each designated use. Site specific criteria are also located in the standards.

For the numeric standards for toxic pollutants see Appendix B.

For a summary of surface water quality standards by designated use see Appendix A, Table 3.

South Dakota's Water Quality Standards can be found at http://legis.state.sd.us/rules/rules/7451.htm

VI) Assessment Protocols Used to Determine Standards

The **Water Quality Standards Handbook**, 1983 and August 1994, is used to develop the Standards that waterbodies of South Dakota must pass. **Water Quality Standards Handbook**, December 1983 and August 1994, U.S. Environmental Protection Agency, Office of Water Regulations and Standards. Copies are available from the U.S. Environmental Protection Agency, Region VIII, Denver, Colorado 80203. There is no charge for this document.

The same methods must be used to propose modification of criteria for specific sites**.** Criteria established in §§ 74:51:01:31, 74:51:01:32, and 74:51:01:44 to 74:51:01:54, inclusive, and in § 74:51:01:56 or 74:51:01:57 may be modified to reflect local conditions through determination of site-specific criteria for toxic pollutants in a segment. Modification of criteria must incorporate analyses of physical, chemical, and biological conditions of the receiving waters to assure maintenance of the assigned beneficial use. Actual effluents or effluent simulations may be evaluated in a toxicity testing program conducted under environmental conditions similar to the discharge site in the receiving waters. Analytical procedures, calculation procedures used to measure or demonstrate

the toxicological significance of a pollutant, and numerical criteria may be modified by the board after opportunity for public review and comment.

All data necessary to defend the proposed modification of criteria are the responsibility of the person or entity requesting the modification. Methods used to develop site-specific criteria must be approved by the secretary and shall include methods to evaluate effects of bioaccumulative pollutants where appropriate. The Water Quality Standards Handbook, 1983 and August 1994, may be used as guidance in developing methods.

VII) Stream Segmentation System

Beneficial uses assigned to stream segments listed in §§ 74:51:03:04 to 74:51:03:27, inclusive, are indicated by the number of the beneficial use classifications listed in section III) List of Designated Uses. Standards for each designation apply as found in the Water Quality Standards and as seen in Appendix B. Unless otherwise indicated, the entire course of a named stream is the segment with the designated use.

When section, range, and township are used in chapter 74:51:03 to describe the beginning or end point of a stream segment, the boundary of the segment is that point where the most downstream portion of the stream crosses the boundary of that section.

An example of the format for stream segmentation of designated uses can be found in Appendix C.

The same designation and listing system is done for the lakes of South Dakota and can be found in the Water Quality Standards at 74:51:02:03.

VII) Treatment of Water Column

The quality of the water column is subject to both narrative and numeric standards as listed above in V) Basic Standards/Criteria and shown in Appendix A and B. These criteria are applied to sections of watersheds based on their use, as shown in Appendix C.

IX) Treatment of Physical Habitat

Specifics were not found

X) Treatment of Sediment

Specifics were not found

XI) Treatment of Biological

South Dakota has a narrative criterion. The criterion is contained in the Surface Water Quality Standards, which are available on line at: http://www.state.sd.us/denr/DES/Surfacewater/surfwprg.htm

Biological integrity of waters

All waters of the state must be free from substances, whether attributable to human-induced point source discharges or nonpoint source activities, in concentrations or combinations which will adversely impact the structure and function of indigenous or intentionally introduced aquatic communities.

Currently, the South Dakota Department of Environment and Natural Resources (SD DENR) Water Resources Assistance Program (WRAP) collects biological data in addition to chemical and physical parameters for TMDL assessments. These bioassessments are useful in determining the impact of contaminants as well as detecting chronic water quality impairments that may not be discovered by ambient chemical and physical grab samples.

Of the 9,937 total stream miles, approximately 4 miles have been biologically assessed (60 sites assessed; 150 meters per site). SD DENR has not yet established biological criteria for use in water quality standards.

The Water Resource Assistance Program evaluates benthic macroinvertebrate community structure in streams using both the EMAP protocol and US EPA's Rapid Bioassessment Protocols (RBPs) in conjunction with assessments of stream habitats. All biological samples are identified to the lowest possible level of taxonomic resolution. Biological data are entered into the STORET database and are summarized using multimetric indices and descriptive statistics. SD DENR intends to use the biological data to identify potential reference sites for determining the condition of water quality and the integrity of the biological community. WRAP is beginning to sample periphyton communities to determine if they are a better biological indicator of water quality.

For an overview of South Dakota's Biological Assessment, see Appendix E.

XII) Treatment of Wetlands

For information on the Treatment of Wetlands in Colorado, see a separate document entitled "Treatment of Wetlands by State."

XIII) 305b Reports

Section 305(b) of the Clean Water Act requires that states, territories, and jurisdictions assess their water quality biennially and report those findings to the U.S. Environmental Protection Agency (EPA). EPA then summarizes the findings in a national water quality inventory. It is important to note that this report is no longer a Report to Congress, pursuant to Public Law 104-66, the Federal Reports Elimination and Sunset Act of 1995. To assess water quality, states and other jurisdictions compare their monitoring results to the water quality standards they have set for their waters. Water quality standards consist of three elements: the designated uses assigned to waters (such as drinking, swimming, or fishing), criteria to protect those uses (such as chemical-specific thresholds that should not be exceeded), and an antidegradation policy intended to keep waters that *do* meet standards from deteriorating from their current condition.

This data is compiled into the National Water Quality Inventory biennially. The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

The 2000 305(b) report can be obtained by contacting Sandy Foell, Secretary of the SD DENR at (605) 773-3351

The 2002 National Water Quality Inventory is the latest report available and can be accessed at *www.epa.gov/305b/2000report/alhi.pdf*

XIV) 303d lists

Section 303(d) of the federal Clean Water Act (and related regulations requires states to assess the condition of their waters to determine where water quality is impaired (does not fully meet standards) or threatened (is likely to violate standards in the near future). The result of this review is the 303(d) list, which must be submitted to the EPA every other year. Section 303(d) also requires states to prioritize and target water bodies on their list for development of water quality improvement strategies (i.e. TMDLs), and to develop such strategies for impaired and threatened waters.

TMDLs are calculations to determine the sum allowable load of a pollutant from all contributing point and nonpoint sources, that a waterbody can receive and still meet the applicable water quality standards. The calculation must include contributions from natural sources and have a margin of safety to ensure that the water body can be used for its designated beneficial use.

TMDLs must be developed for water bodies that do not meet the water quality standards, or might not meet water quality standards with the application of *technology-based controls* for point sources. In these cases, point sources of pollution would need additional *water quality-based controls*. Once the state has developed a TMDL, a public notice is required and it must be approved by the Environmental Protection Agency (EPA).

For South Dakota's 2002 303(d) list see
http://www.state.sd.us/denr/DES/Surfacewater/IPermits/2002_303(d).pdf

Streams and Lakes on the 303(d) list are categorized by Basin, and then by waterbody. Other columns in the 303(d) list include:

- Location
- Map ID (locations on map on page 45 of the 2002 303(d) list
- Source of data for listing

- Beneficial Use
- Reason for Listing
- TMDL Priority (see Appendix H)

For a summary of the 2002 TMDL waterbodies by basin and an example page of the 2002 303(d) list Appendix G

XV) Assessment protocols for listing and delisting

EPA will review and approve, partially approve/disapprove, or disapprove state or territorial 303(d) lists of impaired and threatened waters requiring a TMDL (Category 5). EPA's review and approval of the 303(d) list will be based on a determination that the state's or territory's assessment and listing methodology was used to prepare the list, that the assessment and listing methodology is scientifically sound, that it is consistent with the state's or territory's water quality standards, and that the state or territory reasonably considered all existing and readily available data and information, and listed all waters not attaining water quality standards. Upon completing its review of the 303(d) list, EPA will send a letter to the state or territory notifying it of full approval, partial approval/disapproval, or disapproval. If the list is partially approved/disapproved, or disapproved, EPA will develop a list for the state or territory. EPA will also provide 30 days for public comment on the EPA developed list.

To ensure that each listing is defensible, the DENR established minimum requirements for the data to be used as a basis for listing. Waters were listed that met all of the following criteria:

- Age of data was five years or less for streams and beaches, and ten years or less for lakes, unless there was adequate justification to use older data;
- Lakes must have been sampled in at least two separate years within the ten-year period;
- Data collected through instantaneous and grab sampling or expressed as a geometric mean met minimum sampling requirements as specified in the South Dakota Surface Water Quality Standards; and
- Data collection and analyses followed established department Quality Assurance/Quality Control (QA/QC) standards as defined in “Standard Operating Procedures for Field Samplers,” South Dakota Department of Environment and Natural Resources, January 2000 or met minimum QA/QC as defined by the responsible agency.

Water quality problems reported by other agencies, institutions, and the public had to be accompanied by data which met the above requirements or be confirmed by DENR data.

For more details concerning South Dakota’s 303(d) listing and delisting procedures see Appendix H.

XVI) Assessment for National Point Source Discharge Elimination System (NPDES) permits

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

South Dakota is a delegated permit authority.

In South Dakota, these permits are referred to as Surface Water Discharge permits. The state issues Surface Water Discharge permits to any point source that is discharging wastewater to waters of the state. The permits contain effluent limits that will protect the beneficial uses of our surface waters. The permits also contain the sampling and reporting requirements that each facility must follow. For more information about who needs a Surface Water Discharge permit, see our South Dakota Permitting Guide at http://www.state.sd.us/denr/enviro/npdes.htm for information, or contact Kelli Buscher at (605) 773-3351.

XVII) Resources

River Network: http://www.rivernetwork.org/index.cfm

State-by-State Clean Water Act: http://www.rivernetwork.org/cleanwater/cwa_search.asp

National Water Quality Control Council (NWQCC); data comparability and collaboration: http://wi.water.usgs.gov/pmethods/mdcbfs.pdf

NWQCC minimum list of metadata elements: http://wi.water.usgs.gov/pmethods/elements/list.htm

Surface Water Quality Program: http://www.state.sd.us/denr/DES/Surfacewater/surfwprg.htm

South Dakota's Water Quality Standards: http://legis.state.sd.us/rules/rules/7451.htm

South Dakota's Antidegradation Policy: http://www.rivernetwork.org/library/librivcwa_antideg_SD_Policy.PDF

South Dakota's 2002 TMDL 303(d) list: http://www.state.sd.us/denr/DES/Surfacewater/IPermits/2002_303(d).pdf

Stueven, E., A. Wittmuss, and R.L. Smith. 2000. *Standard Operating Procedures for Field Samplers. Revision 4.0, January 2000*. South Dakota Department of Environment and Natural Resources, Water Resource Assistance Program. Pierre, SD.

Ecoregion Targeting of Impaired Lakes in South Dakota (May 2000)

For a copy of the *National Water Quality Inventory:2000 Report* (EPA-841-R-02-001), visit *www.epa.gov/305b/2000report/alhi.pdf* or call the EPA's National Service Center for Environmental Publications at 1-800-490-9198

EPA National TMDL home page: This site provides an overview of the national TMDL program with links to pertinent information on state programs. It includes information on TMDL laws and regulations, policies, documents, examples of TMDLs, and more. www.epa.gov/owow/tmdl

EPA Region 8 TMDL program: This site provides specific information on TMDL programs in EPA Region 8 (Montana, Wyoming, North Dakota, South Dakota, Colorado, and Utah). www.epa.gov/Region8/water/tmdl/index.html

Adopt Your Watershed: Learn about organizations active in your watershed! Over 4,000 watershed groups are listed. Also includes tools and resources to help new groups get started. Visit EPA's Adopt Your Watershed site at www.epa.gov/adopt/

Surf Your Watershed: This site provides multi-level water resource information. Enter your zip code and learn the facts about your watershed and ways you can get involved. Visit EPA's Surf Your Watershed site at www.epa.gov/surf

XVIII) Glossary

Acronyms

- ARSD – Administrative Rules of South Dakota
- CCC – Criteria Continuous Concentration
- CMC – Criteria Maximum Concentration
- CWA – Clean Water Act
- DENR – Department of Environmental and Natural Resources
- EPA – Environmental Protection Agency
- NPDES – National Pollutant Discharge Elimination System
- QA/QC – Quality Assurance/ Quality Control
- RBPs – Rapid Bioassessment Protocols

- TMDLs – Total Maximum Daily Loads
- WRAP – Water Resources Assistance Program
- WQS – Water Quality Standards

Clean Water Act Words (Section 1)

Regular font definition found in state documents, *italic font definitions not directly found in state documents and thus might be different.*

- Benthic Macroinvertebrates – *organisms that reside the majority of their life cycle on the bottom of running water ecosystems such as rivers. Some benthic taxa are also found in wetland and lake environments. These organism are excellent indicator species, they are easy and cheap to collect and are exposed to pollutants and environment in a variety of life cycles. Some states have biological macroinvertebrate criteria, but Colorado does not at this time.*
- Composite Samples – *a type of sample that combines sub-samples from various and multiple locations of the sample population to produce a representative sample, for example, collecting several surface water samples across a transect of a stream.*
- Grab Samples – *a type of sample that is collected from usually one representative location in the sample population, such as a stream bank of a river.*
- Ground Water – *are subsurface waters in a zone of saturation which are or can be brought to the surface of the ground or to surface waters through wells, springs, seeps or other discharge areas.*
- Nonpoint Source Pollutants – a source of pollution that is not defined as a point source.
- Point Source Pollutants – a discernable, confined, and discrete conveyance, including a pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, animal feeding operation, or vessel or other flowing craft, from which pollutants are or may be discharged.
- Surface Water – lakes, ponds, streams, rivers, wetlands, and any other body or accumulation of water on the land surface that is considered to be waters of the state, but not waste treatment systems, including treatment ponds, lagoons, leachate collection ponds, or stormwater retention ponds designed to meet the requirements of the CWA other than cooling ponds as defined in 40 C.F.R. § 423.11(m) (July 1, 1991).
- Triennial Review Process – *Federal and Colorado Clean Water Act requires that criteria, designated uses and segmentation are reviewed for each major basin in*

a three year rotating cycle (hence tri-ennial review). There is a three hearing process for this review an information scoping hearing, an information formulation hearing and then a formal rulemaking hearing. These three hearings take a total of two years to complete. Each calendar year two basins are actively in one of the hearing phases. Every fourth year the basic standards, rules that apply to all basins and segments, often as default criteria are reviewed, thus the reality is that every basin is reviewed every five years.

Antidegradation Policy for South Dakota CWA (Section 2)

- None

South Dakota Wetlands (Section 3)

- Lacustrine – *Lake-like*
- Palustrine – *Marsh or Pond-like*
- Riverine – *River-like*

XIX) Appendices

Appendices A through H are referenced the throughout the previous chapters of this document. Sources of the information and the associated websites are listed in chapter XX.

Appendix A
Designated Uses

Data Evaluation

Specific criteria were developed to define how data would be evaluated to determine the status of a waterbody. In reviewing the data, the criteria in Table 4 were used:

Table 4. Criteria for Evaluating Water Quality Data (Streams)

Description	Criteria Used
Number of observations (samples) required to consider data representative of actual conditions	20 samples for any one parameter required at any site over a five-year period. If greater than 25% of samples exceed water quality standards, this threshold was reduced to 10 samples, since impairment is more likely. In addition, the sample threshold was reduced to five samples if 100% of the samples indicated full support for that parameter. In specific instances, fewer than 20 samples were used if the results showed overwhelming evidence of support of nonsupport.
Required percentage of samples exceeding water quality standards in order to be listed	>10% (>25% if less than 20 samples available).
Data age	Data must be less than five years old unless there is justification that data is representative of current conditions. While a data age of two years matches the 305(b) listing cycle, it does not allow for enough samples to accurately portray variability.
Quality Assurance/Quality Control	There must be a consensus that the data meets QA/QC requirements similar to those outlined in DENR protocols. The public was encouraged to submit QA/QC data.

Use support was based the frequency of exceedences of water quality standards for any of the following parameters (if applicable): total suspended solids, total dissolved solids, pH, water temperature, dissolved oxygen, unionized ammonia, fecal coliform (May 1 - September 30), metals, and others. A stream segment with only a slight exceedence (< 10% violations for one or more parameters) is considered fully supporting its assigned beneficial uses. The EPA established the following general criteria in the 1992 305(b) Report Guidelines suitable for determining use support of monitored streams:

Fully supporting	1 - 10% of values violate standards
Partially supporting	11 - 25% of values violate standards
Not supporting	>25% of values violate standards

Use support assessment for fishable use (fish life propagation) primarily involved monitoring levels of the following major parameters: dissolved oxygen, unionized ammonia, water temperature, pH, and suspended solids.

Use support for swimmable uses and limited contact recreation involved monitoring the levels of fecal coli-form (May 1 - September 30) and dissolved oxygen.

Lake Methodologies

Water Quality Standards Applicable to Lakes

South Dakota's numeric water quality standards criteria (summarized in Table 3) established for various beneficial uses apply to lakes as well as streams. There are also several narrative water quality standards, Table 5, that were considered as assessment methodologies that were developed for lakes.

Table 5. Narrative Water Quality Standards Applicable to Lakes

74:51:01:05. Materials causing pollutants to form in waters. Wastes discharged into surface waters of the state may not contain a parameter which violates the criterion for the waters' designated beneficial use or impairs the aquatic community as it naturally occurs. Where the interaction of materials in the wastes and the waters causes the existence of such a parameter, the material is considered a pollutant and the discharge of such pollutants may not cause the criterion for this parameter to be violated or cause impairment to the aquatic community.
74:51:01:06. Visible pollutants prohibited. Raw or treated sewage, garbage, rubble, unpermitted fill materials, municipal wastes, industrial wastes, or agricultural wastes which produce floating solids, scum, oil slicks, material discoloration, visible gassing, sludge deposits, sediments, slimes, algal blooms, fungus growths, or other offensive effects may not be discharged or cause to be discharged into surface waters of the state.
74:51:01:08. Taste- and odor- producing materials. Materials which will impart undesirable tastes or undesirable odors to the receiving waters may not be discharged into surface waters of the state in concentrations that impair a beneficial use.
74:51:01:09. Nuisance aquatic life. Materials which produce nuisance aquatic life may not be discharged or caused to be discharged into surface waters of the state in concentrations that impair a beneficial use or create a human health problem.

Sources of Data

Data (ten years old or less) used for the comparison of lakes within ecoregions was compiled from all appropriate data available to DENR. Most of the data came from the DENR's statewide lakes assessment effort, however, data from individual lake studies and the Department of Game, Fish and Parks were also included.

A total of 573 lakes have assigned beneficial uses. South Dakota has developed a strategy to evaluate lake water quality on an ecoregion basis. This ecoregion effort requires the determination of reference lakes within each ecoregion for comparative purposes. To accomplish this, 124 of the 573 lakes have been sampled periodically between 1991 and 2001. The remaining 449 lakes did not meet the following criteria necessary for inclusion:

- A lake must be publicly owned,
- A lake must have public access, and
- A lake must have regional significance,

The 124 lakes are sampled on a schedule that results in each lake being sampled once every four years (i.e. about 31 lakes are sampled per year). In the year a lake is scheduled, it is sampled twice. The methodology used for the sampling is found in the *1995 South Dakota Lakes Assessment Report.* This document can be found on DENR's website at: **http://www.state.sd.us/denr/DFTA/WatershedProtection/WQInfo.htm**.

Evaluation of lake data was automated by the use of the STORET database. Additional data was received as a result of DENR's request for water quality data during the public input process. The data was used when it met the minimum data requirements described in Table 4.

Appendix B
Basic Standards and Treatment of Water Column

74:51:01:44. Criteria for domestic water supply waters. The criteria of parameters for domestic water supply waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions
Total dissolved solids	≤ 1,000	mg/L	30-day average
	≤ 1,750	mg/L	daily maximum
Nitrates as N	≤ 10	mg/L	
pH	≥ 6.5 - ≤ 9.0	units	
Total Coliform	≤ 5,000	/100 mL	geometric mean of a minimum of 5 samples during separate 24-hour periods for a 30-day period and may not exceed this value in more than 20 percent of the samples examined in the same 30-day period
	≤ 20,000	/100 mL	in any one sample
Barium	≤ 1.0	mg/L	
Chloride	≤ 250	mg/L	30-day average
	≤ 438	mg/L	daily maximum
Fluoride	≤ 4.0	mg/L	
Sulfate	≤ 500	mg/L	30-day average
	≤ 875	mg/L	daily maximum
Total Petroleum Hydrocarbons	≤ 1.0	mg/L	

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; transferred from § 34:04:02:33, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 14 SDR 86, effective December 24, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:33, July 1, 1996; 24 SDR 10, effective July 20, 1997.

General Authority: SDCL 34A-2-11, 34A-2-93.

Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:45. Criteria for coldwater permanent fish life propagation waters. The criteria of parameters for coldwater permanent fish life propagation waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions
Total ammonia nitrogen as N	Equal to or less than the result from Equation 3	mg/L	30-day average

	in Appendix A		
	Equal to or less than the result from Equation 1 in Appendix A	mg/l	daily maximum
Chlorides	≤ 100	mg/L	30-day average
	≤ 175	mg/L	daily maximum
Dissolved oxygen	≥ 6.0	mg/L	
	≥ 7.0		in spawning areas during the spawning season
Undisassociated hydrogen sulfide	≤ 0.002	mg/L	
pH	≥ 6.6 - ≤ 8.6	units	see § 74:51:01:07
Total Suspended Solids	≤ 30	mg/L	30-day average
	≤ 53	mg/L	daily maximum
Temperature	≤ 65	°F	see § 74:51:01:31

For special effluent limitations related to coldwater fisheries, see § 74:51:01:32.

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; 5 SDR 21, effective September 21, 1978; transferred from § 34:04:02:34, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:34, July 1, 1996; 24 SDR 10, effective July 20, 1997; 31 SDR 29, effective September 13, 2004.
General Authority: SDCL 34A-2-11, 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:46. Criteria for coldwater marginal fish life propagation waters. The criteria of parameters for coldwater marginal fish life propagation waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	**Criteria**	**Unit of Measure**	**Special Conditions**
Total ammonia nitrogen as N	Equal to or less than the result from Equation 3 in Appendix A	mg/L	30-day average
	Equal to or less than the result from Equation 1 in Appendix A	mg/L	daily maximum
Dissolved oxygen	≥ 5.0	mg/L	
Undisassociated hydrogen sulfide	≤ 0.002	mg/L	
pH	≥ 6.5 - ≤ 8.8	units	see § 74:51:01:07

Total Suspended Solids	≤ 90	mg/L	30-day average
	≤ 158	mg/L	daily maximum
Temperature	≤ 75	°F	see § 74:51:01:31

For special effluent limitations related to coldwater fisheries, see § 74:51:01:32.

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; 5 SDR 21, effective September 21, 1978; transferred from § 34:04:02:35, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:35, July 1, 1996; 24 SDR 10, effective July 20, 1997; 31 SDR 29, effective September 13, 2004.
General Authority: SDCL 34A-2-11, 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:47. Criteria for warmwater permanent fish life propagation waters. The criteria of parameters for warmwater permanent fish life propagation waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	**Criteria**	**Unit of Measure**	**Special Conditions**
Total ammonia nitrogen as N	Equal to or less than the result from Equation 3 in Appendix A	mg/L	30-day average March 1 - October 31
	Equal to or less than the result from Equation 4 in Appendix A	mg/L	30 day average November 1 - February 29
	Equal to or less than the result from Equation 2 in Appendix A	mg/L	daily maximum
Dissolved oxygen	≥ 5.0	mg/L	
	≥ 6.0		in Big Stone Lake and Lake Traverse during April and May
Undisassociated hydrogen sulfide	≤ 0.002	mg/L	
pH	≥ 6.5 - ≤ 9.0	units	see § 74:51:01:07
Total Suspended Solids	≤ 90	mg/L	30-day average
	≤ 158	mg/L	daily maximum
Temperature	≤ 80	°F	see § 74:51:01:31

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; 5 SDR 21, effective September 21, 1978; transferred from § 34:04:02:36, effective July 1, 1979; 10

SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:36, July 1, 1996; 24 SDR 10, effective July 20, 1997; 31 SDR 29, effective September 13, 2004.

General Authority: SDCL 34A-2-11, 34A-2-93.

Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:48. Criteria for warmwater semipermanent fish life propagation waters. The criteria of parameters for warmwater semipermanent fish life propagation waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions
Total ammonia nitrogen as N	Equal to or less than the result from Equation 3 in Appendix A	mg/L	30-day average March 1 - October 31
	Equal to or less than the result from Equation 4 in Appendix A	mg/L	30-day average November 1 - February 29
	Equal to or less than the result from Equation 2 in Appendix A	mg/L	daily maximum
Dissolved oxygen	≥ 5.0	mg/L	
Undisassociated hydrogen sulfide	≤ 0.002	mg/L	
pH	≥ 6.5 - ≤ 9.0	Units	see § 74:51:01:07
Total Suspended Solids	≤ 90	mg/L	30-day average
	≤ 158	mg/L	daily maximum
Temperature	≤ 90	°F	see § 74:51:01:31

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; 5 SDR 21, effective September 21, 1978; transferred from § 34:04:02:37, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 14 SDR 86, effective December 24, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:37, July 1, 1996; 24 SDR 10, effective July 20, 1997; 31 SDR 29, effective September 13, 2004.

General Authority: SDCL 34A-2-11, 34A-2-93.

Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:49. Criteria for warmwater marginal fish life propagation waters. The criteria for warmwater marginal fish life propagation waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions

Total ammonia nitrogen as N	Equal to or less than the result from Equation 3 in Appendix A	mg/L	30-day average May 1 - October 31
	Equal to or less than the result from Equation 4 in Appendix A	mg/L	30-day average November 1 - April 30
	Equal to or less than the result from Equation 2 in Appendix A	mg/L	daily maximum
Dissolved oxygen	≥ 4.0	mg/L	
Undisassociated hydrogen sulfide	≤ 0.002	mg/L	
pH	≥ 6.0 - ≤ 9.0	units	see § 74:51:01:07
Total Suspended Solids	≤ 150	mg/L	30-day average
	≤ 263	mg/L	daily maximum
Temperature	≤ 90	°F	see § 74:51:01:31

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; 5 SDR 21, effective September 21, 1978; transferred from § 34:04:02:38, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:38, July 1, 1996; 24 SDR 10, effective July 20, 1997; 31 SDR 29, effective September 13, 2004.

General Authority: SDCL 34A-2-11, 34A-2-93.

Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:50. Criteria for immersion recreation waters. The criteria of parameters for immersion recreation waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions
Dissolved oxygen	≥ 5.0	mg/L	
Fecal coliform (May 1 – September 30)	≤ 200	/100 mL	geometric mean based on a minimum of 5 samples obtained during separate 24-hour periods for any 30-day period, and they may not exceed this value in more than 20 percent of the samples examined in this same 30-day period
	≤ 400		in any one sample

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; transferred from § 34:04:02:40, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:40, July 1, 1996; 24 SDR 10, effective July 20, 1997.
General Authority: SDCL 34A-2-11, 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:51. Criteria for limited contact recreation waters. The criteria of parameters for limited contact recreation waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions
Dissolved oxygen	≥ 5.0	mg/L	
Fecal coliform (May 1 – September 30)	≤ 1,000	/100 mL	geometric mean based on a minimum of 5 samples obtained during separate 24-hour periods for any 30-day period, and they may not exceed this value in more than 20 percent of the samples examined in this same 30-day period
	≤ 2,000		in any one sample

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; transferred from § 34:04:02:41, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:41, July 1, 1996; 24 SDR 10, effective July 20, 1997.
General Authority: SDCL 34A-2-11, 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:52. Criteria for fish and wildlife propagation, recreation, and stock watering waters. The criteria of parameters for fish and wildlife propagation, recreation, and stock watering waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions
Total alkalinity as calcium carbonate	≤ 750	mg/L	30-day average
	≤ 1313	mg/L	daily maximum
Total dissolved solids	≤ 2,500	mg/L	30-day average
	≤ 4,375	mg/L	daily maximum
Conductivity at 25°C	≤ 4,000	micromhos/cm	30-day average
	≤ 7,000	micromhos/cm	daily maximum
Nitrates as N	≤ 50	mg/L	30-day average

	≤ 88	mg/L	daily maximum
pH	≥ 6.0 - ≤ 9.5	units	see § 74:51:01:07
Total petroleum hydrocarbon	≤ 10	mg/L	see § 74:51:01:10
Oil and grease	≤ 10	mg/L	see § 74:51:01:10

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; transferred from § 34:04:02:42, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:42, July 1, 1996; 24 SDR 10, effective July 20, 1997; 25 SDR 98, effective January 27, 1999.
General Authority: SDCL 34A-2-11, 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:53. Criteria for irrigation waters. The criteria of parameters for irrigation waters and their allowable variations that are not included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions
Conductivity at 25°C	≤ 2,500	micromhos/cm	30-day average
	≤ 4,375	micromhos/cm	daily maximum
Sodium adsorption ratio	≤ 10		see definition

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; transferred from § 34:04:02:43, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 14 SDR 86, effective December 24, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:43, July 1, 1996; 24 SDR 10, effective July 20, 1997.
General Authority: SDCL 34A-2-11, 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:53.01. Site specific criterion for irrigation waters -- Belle Fourche River from the Wyoming-South Dakota border to its confluence with the Cheyenne River. The following site-specific criterion for irrigation waters is established for the Belle Fourche River from the Wyoming-South Dakota border to its confluence with the Cheyenne River:

Sodium adsorption ratio	≤ 6		See definition

Source: 31 SDR 29, effective September 13, 2004.
General Authority: SDCL 34A-2-11, 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:54. Criteria for commerce and industry waters. The criteria of parameters for commerce and industry waters and their allowable variations that are not

included under § 74:51:01:55 and Appendix B, unless set under § 74:51:01:24, are as found in the following table:

Parameter	Criteria	Unit of Measure	Special Conditions
Total dissolved solids	≤ 2,000	mg/L	30-day average
	≤ 3,500	mg/L	daily maximum
pH	≥ 6.0 - ≤ 9.5	units	see § 74:51:01:07

Source: SL 1975, ch 16, § 1; transferred from § 34:04:02:44, effective July 1, 1979: 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:44, July 1, 1996; 24 SDR 10, effective July 20, 1997.

General Authority: SDCL 34A-2-11, 34A-2-93.

Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:01:55. Criteria for toxic pollutants. Toxic pollutants at levels which are or may become injurious to public health, safety, or welfare; plant, aquatic, and animal life; or the existing or designated uses of waters may not be present in the surface waters of the state. The toxic pollutants to which this section applies are the priority pollutants and chemicals in 40 C.F.R. Part 131 (July 1, 2003) and any other toxic pollutants or substances determined by the secretary to be of concern at a specific site. Appendix B at the end of this chapter lists the priority pollutants and chemicals for which specific numerical criteria have been adopted by the board.

The levels of toxic pollutants allowed in surface waters shall be determined by the secretary in accordance with the chronic/acute criteria levels specified for human health and aquatic life in the National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047, November 2002) and as translated in Appendix B. The secretary shall use a one-in-a-million (10^{-6}) risk level when determining applicable human health criteria.

Upon written request, the board may determine allowable levels of toxic pollutants in surface waters of the state in accordance with § 74:51:01:23 or 74:51:01:24, after opportunity for public review and comment. If a numerical criterion has been established for a toxic pollutant in §§ 74:51:01:31, 74:51:01:32, and 74:51:01:44 to 74:51:01:54, inclusive, and in § 74:51:01:56, the provisions of this section do not apply to that substance. Toxic pollutants identified in and allowed by §§ 74:51:01:58 and 74:51:01:59 for water resource enhancement or restoration projects are exempt from the provisions of this section.

Source: SL 1975, ch 16, § 1; transferred from § 34:04:02:14, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 14 SDR 86, effective December 24, 1987; 16 SDR 196, effective May 23, 1990; 18 SDR 128, effective February 11, 1992; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:14, July 1, 1996; 24 SDR 10, effective July 20, 1997; 25 SDR 98, effective January 27, 1999; 31 SDR 29, effective September 13, 2004.

General Authority: SDCL 34A-2-11, 34A-2-93.

Law Implemented: SDCL 34A-2-10, 34A-2-11.

Reference: National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047, November 2002). This can be downloaded free from the United States Environmental Protection Agency's website at http://epa.gov/waterscience/standards/wqcriteria.html.

Cross-References: Toxic pollutant criteria, Appendix B, ch 74:51:01; Protection of wetlands as waters of the state, § 74:51:01:11.

SOUTH DAKOTA SURFACE WATER QUALITY STANDARDS[1] FOR TOXIC POLLUTANTS - ARSD 74:51:01					
Pollutant	CAS Number	Human Health Value Concentrations in Φg/L		Freshwater Aquatic Life Value Concentrations in Φg/L Uses 2-3-4-5-6-9	
		Use 1[3]	Uses 2-3-4-5-6-9[4]	Acute (CMC)	Chronic (CCC)
Acenaphthene	83329	670	990		
Acenaphthylene (PAH)[6]	208968				
Acrolein	107028	190	290		
Acrylonitrile[5]	107131	0.051	0.25		
Aldrin[5]	309002	0.000049	0.000050	1.5	
Anthracene (PAH)[6]	120127	8,300	40,000		
Antimony	7440360	5.6	640		
Arsenic[5]	7440382	0.018[5][13]	0.14[5][13]	340	150
Asbestos[5]	1332214	7,000,000 fibers/L			
alpha-BHC[5]	319846	0.0026	0.0049		
beta-BHC[5]	319857	0.0091	0.017		
gamma-BHC (Lindane)[5]	58899	0.98	1.8	0.95	
Benzene[5]	71432	2.2	51		
Benzidine[5]	92875	0.000086	0.00020		
Benzo(a)Anthracene[5]	56553	0.0038	0.018		
Benzo(a)Pyrene[5]	50328	0.0038	0.018		
Benzo(b)Fluoroanthene[5]	205992	0.0038	0.018		
Benzo(k)Flouroanthene[5]	207089	0.0038	0.018		
Beryllium[5]	7440417	4[14]			
Bis(2-Chloroethyl)Ether[5]	111444	0.030	0.53		
Bis(2-Chloroisopropyl)Ether	108601	1,400	65,000		
Bis(2-Ethylhexyl)Phthalate[5]	117817	1.2	2.2		
Bromoform[6]	75252	4.3	140		
Butylbenzyl Phthalate	85687	1,500	1,900		

SOUTH DAKOTA SURFACE WATER QUALITY STANDARDS[1] FOR TOXIC POLLUTANTS - ARSD 74:51:01					
Pollutant	CAS Number	Human Health Value Concentrations in Φg/L		Freshwater Aquatic Life Value Concentrations in Φg/L Uses 2-3-4-5-6-9	
		Use 1[3]	Uses 2-3-4-5-6-9[4]	Acute (CMC)	Chronic (CCC)
Cadmium	7440439			2.0[9]	0.25[9]
Carbon Tetrachloride[5]	56235	0.23	1.6		
Chlordane[5]	57749	0.00080	0.00081	1.2	0.0043
Chlorine	7782505			19	11
Chlorobenzene	108907	130	1,600		
Chlorodibromomethane[5]	124481	0.40	13		
Chloroform[5]	67663	5.7	470		
2-Chloronaphthalene	91587	1,000	1,600		
2-Chlorophenol	95578	81	150		
Chromium(III)	16065831			570[9]	74[9]
Chromium(VI)	18540299			16	11
Chrysene[5]	218019	0.0038	0.018		
Copper	7440508	1,300		13[9]	9.0[9]
Cyanide (week acid dissociable)	57125	140	140	22	5.2
4,4'-DDD[5]	72548	0.00031	0.00031		
4,4'-DDE[5]	72559	0.00022	0.00022		
4,4'-DDT[5][7]	50293	0.00022	0.00022	0.55	0.001
Dibenzo(a,h)Anthracene[5]	53703	0.0038	0.018		
1,2-Dichlorobenzene	95501	420	1,300		
1,3-Dichlorobenzene	541731	320	960		
1,4-Dichlorobenzene	106467	63	190		
3,3'-Dichlorobenzidine[5]	91941	0.021	0.028		
Dichlorobromomethane[6]	75274	0.55	17		
1,2-Dichloroethane[5]	107062	0.38	37		
1,1-Dichloroethylene[5]	75354	330	7,100		
2,4-Dichlorophenol	120832	77	290		
1,2-Dichloropropane[5]	78875	0.50	15		
1,3-Dichloropropene	542756	0.34	21		
Dieldrin[5]	60571	0.000052	0.000054	0.24	0.056
Diethyl Phthalate	84662	17,000	44,000		
2,4-Dimethylphenol	105679	380	850		
Dimethyl Phthalate	131113	270,000	1,100,000		
Di-n-Butyl-Phthalate	84740	2,000	4,500		
2-Methyl-4,6-Dinitrophenol	534521	13	280		

2,4-Dinitrophenol	51285	69	5,300		
Dioxin (2,3,7,8-TCDD[5]	1746016	5.0E-9	5.1E-9		
2,4-Dinitrotoluene[5]	121142	0.11	3.4		
1,2-Diphenylhydrazine[5]	122667	0.036	0.20		
alpha-Endosulfan	959988	62	89	0.11	0.056
beta-Endosulfan	33213659	62	89	0.11	0.056
Endosulfan Sulfate	1031078	62	89		
Endrin	72208	0.059	0.060	0.086	0.036
Endrin Aldehyde	7421934	0.29	0.30		
Ethylbenzene	100414	530	2,100		
Flouranthene	206440	130	140		
Fluorene[6]	86737	1,100	5,300		
Heptachlor[5]	76448	0.000079	0.000079	0.26	0.0038
Heptachlor epoxide[5]	1024573	0.000039	0.000039	0.26	0.0038
Hexachlorobenzene[5]	118741	0.00028	0.00029		
Hexachlorobutadiene[5]	87683	0.44	18		
Hexachlorocyclopentadiene	77474	40	1,100		
Hexachloroethane[5]	67721	1.4	3.3		
Ideno(1,2,3-cd)Pyrene	193395	0.0038	0.018		
Isophorone[5]	78591	35	960		
Lead	7439921			65[9]	2.5[9]
Mercury	7439976	0.050	0.051	1.4	0.012[10]
Methyl Bromide	74839	47	1,500		
Methyl Chloride[6]	74873				
Methylene Chloride[5]	75092	4.6	590		
N-Nitrosodimethylamine[5]	62759	0.00069	3.0		
N-Nitrosodi-n-Propylamine[5]	621647	0.0050	0.51		
N-Nitrosodiphenylamine[5]	86306	3.3	6.0		
Nickel	7440020	610	4,600	470[9]	52[9]
Nitrobenzene	98953	17	690		
Polychlorinated Biphenyls, PCBs[2][5][7][11]		0.000064	0.000064		0.014
Pentachlorophenol	87865	0.27	3.0	19[8]	15[8]
Phenanthrene[6]	85018				
Phenol	108952	21,000	1,700,000		
Pyrene[6]	12900	830	4,000		
Selenium[7]	7782492	170	4,200	[12]	4.6
Silver	7440224			3.2[9]	
1,2,4-Trichlorobenzene	120821	35	70		
1,1,2,2-Tetrachloroethane[5]	79345	0.17	4.0		
Tetrachloroethylene[6]	127184	0.69	3.3		
Thallium	7440280	0.24	0.47		
Toluene	108883	1,300	15,000		
Toxaphene[5]	8001352	0.00028	0.00028	0.73	0.0002
1,2-Trans-Dichloroethylene	156605	140	10,000		

1,1,1-Trichloroethane	71556				
1,1,2-Trichloroethane(5)	79005	0.59	16		
Trichloroethylene(5)	79016	2.5	30		
2,4,6-Trichlorophenol(5)	88062	1.4	2.4		
Vinyl Chloride(5)	75014	0.025	2.4		
Zinc	7440666	7,400	26,000	120(9)	120(9)

SOUTH DAKOTA
Surface Water Quality Standards(1)
for Toxic Pollutants

(1) The aquatic life values for arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury (acute), nickel, selenium, silver and zinc given in this document refer to the dissolved amount of each substance unless otherwise noted. All surface water discharge permit effluent limits for metals shall be expressed and measured in accordance with § 74:52:03:16.

(2) Apply to the beneficial uses as designated but do not supersede those standards for certain toxic pollutants as previously established in §§ 74:51:01:31, 74:51:01:32, 74:51:01:44 to 74:51:01:54, inclusive, and § 74:51:01:56.

(3) Based on two routes of exposure - ingestion of contaminated aquatic organisms and drinking water.

(4) Based on one route of exposure - ingestion of contaminated aquatic organisms only.

(5) Substance classified as a carcinogen with the value based on an incremental risk of one additional instance of cancer in one million persons (10^{-6}).

(6) Chemicals which are not individually classified as carcinogens but which are contained within a class of chemicals with carcinogenicity as the basis for the criteria derivation for that class of chemicals; an individual carcinogenicity assessment for these chemicals is pending.

(7) Also applies to all waters of the state.

(8) pH-dependent criteria. Value given is an example only and is based on a pH of 7.8. Criteria for each case must be calculated using the following equation taken from National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047, November 2002):

Pentachlorophenol (PCP), ug/L

Chronic = $e^{[1.005(pH) - 5.134]}$ Acute = $e^{[1.005(pH) - 4.869]}$

(9) Hardness-dependent criteria in ug/L. Value given is an example only and is based on a $CaCO_3$ hardness of 100 mg/L. Criteria for each case must be calculated using the following equations taken from National Recommended Water Quality Criteria: 2002 (EPA-822-R-02-047, November 2002):

Cadmium, ug/L

Chronic = (*0.909)$e^{(0.7409[\ln(hardness)]-4.719)}$

Acute = (*0.944)$e^{(1.0166[\ln(hardness)]-3.924)}$

*Conversion factors are hardness-dependent. The values shown are with a hardness of 100 mg/L as calcium carbonate ($CaCO_3$). Conversion factors (CF) for any hardness can be calculated using the following equations:

Chronic: CF = 1.101672 - [(ln hardness)(0.041838)]
Acute: CF = 1.136672 - [(ln hardness)(0.041838)]

Chromium (III), ug/L

Chronic = (0.860)$e^{(0.8190[\ln(hardness)]+0.6848)}$

Acute = (0.316)$e^{(0.8190[\ln(hardness)]+3.7256)}$

Copper, ug/L

Chronic = (0.960)$e^{(0.8545[\ln(hardness)]-1.702)}$

Acute = (0.960)$e^{(0.9422[\ln(hardness)]-1.700)}$

Lead, ug/L

Chronic = (*0.791)$e^{(1.273[\ln(hardness)]-4.705)}$

Acute = (*0.791)$e^{(1.273[\ln(hardness)]-1.460)}$

*Conversion factors are hardness-dependent. The values shown are with a hardness of 100 mg/L as calcium carbonate ($CaCO_3$). Conversion factors (CF) for any hardness can be calculated using the following equations:

Acute and Chronic: CF = 1.46203 - [(ln hardness)(0.145712)]

Nickel, ug/L

Chronic = (0.997)$e^{(0.8460[\ln(hardness)]+0.0584)}$

Acute = (0.998)$e^{(0.8460[\ln(hardness)]+2.255)}$

Silver, ug/L

Acute = (0.85)$e^{(1.72[\ln(hardness)]-6.59)}$

Zinc, ug/L

Chronic = (0.986)$e^{(0.8473[\ln(hardness)]+0.884)}$

Acute = (0.978)$e^{(0.8473[\ln(hardness)]+0.884)}$

(10) These criteria are based on the total-recoverable fraction of the metal.

(11) This criterion applies to total pcbs, (e.g. the sum of congener or all isomer or homolog or Aroclor analyses.

(12) The (0.996)CMC = 1/[fl/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 Φg/L and 12.82 Φg/L, respectively.

(13) This criterion for arsenic refers to the inorganic form only.

Water Quality Standards ***(from the 2002 303(d) list)***

South Dakota's numeric water quality standards are summarized in the table below. These standards have been established for various beneficial uses as defined in the ARSD Article 74:51.

Table 3. Summary of Numeric Surface Water Quality Standards

Parameters [3] (mg/L) except where noted	(1) Domestic water supply	(2) Coldwater permanent fish life propagation	(3) Coldwater marginal fish life propagation	(4) Warmwater permanent fish life propagation	(5) Warmwater semi-permanent fish life propagation	(6) Warmwater marginal fish life propagation	(7) Immersion recreation	(8) Limited contact recreation	(9) Fish and wildlife propagation, recreation, & stock watering	(10) Irrigation	(11) Commerce & industry
Alkalinity ($CaCO_3$)									750[1]/ 1,313[2]		
Barium	1.0										
Chloride	250[1]/ 438[2]	100[1]/175[2]									
Chlorine, total residual		0.019 acute 0.011 chronic	0.019 acute 0.011 chronic	0.019 acute 0.011 chronic	0.019 acute 0.011 chronic	0.019 acute 0.011 chronic					
Coliform, total (per 100 mL)	5,000 (mean); 20,000 (single sample)										
Coliform, fecal (per 100 mL) May 1 - Sept. 30							200 (mean); 400 (single sample)	1,000 (mean); 2,000 (single sample)			
Conductivity (mohms/cm @ 25° C)									4,000[1]/ 7,000[2]	2,500[1]/ 4,375[2]	
Fluoride	4.0										
Hydrogen sulfide, undissociated		0.002	0.002	0.002	0.002	0.002					
Nitrogen, unionized ammonia as N		0.02[1]/ 1.75X the criterion	0.02[1]/ 1.75X the criterion	0.04[1]/ 1.75X the criterion	0.04[1]/ 1.75X the criterion	0.05[1]/ 1.75X the criterion					
Nitrogen, nitrates as N	10.0								50[1]/ 88[2]		
Oxygen, dissolved		≥ 6.0; ≥ 7.0 (during spawning season)	≥ 5.0	≥ 5.0;	≥ 5.0	≥ 4.0	≥ 5.0	≥ 5.0			
pH (units)	6.5 - 9.0	6.6 - 8.6	6.5 - 8.8	6.5 - 9.0	6.5 - 9.0	6.0 - 9.0			6.0 – 9.5		6.0 - 9.5
Sodium adsorption ratio										10	
Solids, suspended		30[1]/ 53[2]	90[1]/ 158[2]	90[1]/ 158[2]	90[1]/ 158[2]	150[1]/ 263[2]					
Solids, total	1,000[1]/								2,500[1]/		2,000[1]/

Table 3. Summary of Numeric Surface Water Quality Standards

Parameters [3] (mg/L) except where noted	(1) Domestic water supply	(2) Coldwater permanent fish life propagation	(3) Coldwater marginal fish life propagation	(4) Warmwater permanent fish life propagation	(5) Warmwater semi-permanent fish life propagation	(6) Warmwater marginal fish life propagation	(7) Immersion recreation	(8) Limited contact recreation	(9) Fish and wildlife propagation, recreation, & stock watering	(10) Irrigation	(11) Commerce & industry
dissolved	1,750[2]								4,375[2]		3,500[2]
Sulfate	500[1]/ 875[2]										
Temperature (° F)		65	75	80	90	90					
Total petroleum hydrocarbons	≤ 1.0								≤ 10		
Oil and grease									≤ 10		

[1] 30-day average [2] daily maximum [3] water quality standards for toxic pollutants are not included in this summary

Use support for streams was determined by comparing actual water quality data to the applicable numeric surface water quality standards. In evaluating data against the water quality standards, consideration must be made whether to compare to the daily maximum (acute) standard or 30-day average (chronic) standard, where they exist. The water quality standards define a 30-day average as "the arithmetic mean of three consecutive samples taken in separate weeks in a 30-day period." Most of the water quality data was taken at such intervals that a computation of monthly averages was not possible. Therefore, most data was compared to the acute standard, except in cases where the chronic standard is required to be maintained at all times or where no acute standard was applicable.

Surface Water Quality Standards for Metals

South Dakota surface water quality standards for metals are based on the federal EPA criteria documents and EPA recommendations. Consistent with EPA guidance, the water quality standard for most of the metals is based on the measured hardness of the water. As the hardness increases, the toxicity of the metal in the water generally decreases. This is true except for mercury, arsenic, selenium, and hexavalent chromium. For these four metals, there is one criterion that is applicable at all times regardless of the hardness of the water.

Most of the water quality data for metals collected by the state are from streams located in the northern Black Hills. This area of South Dakota contains a majority of the permitted mining activities and has a very complex geology. Because of these two factors, the DENR has made it a priority to monitor these streams for metal concentrations.

Sources of Data

Data was obtained from the stream-monitoring sites maintained by DENR. A network of 134 water quality monitoring (WQM) sites is being monitored. For a listing and map of WQM sites, see DENR's web page at: **http://www.state.sd.us/denr/DES/Surfacewater/watermonitoring.htm**. Periodic sampling of these sites is performed, with monthly, quarterly, or seasonal frequencies, depending on the site. Different parameters are sampled depending on the beneficial uses assigned to the waterbody and programmatic needs. Evaluation of data from DENR's WQM sites was automated by the use of the STORET database. STORET is a federal database of surface water quality data collected by various state and federal agencies.

Additional information was also received as a result of DENR's request during the public input process on the 2002 303(d) list. This information ranged from general comments regarding specific waterbodies that should be listed, to actual sample results from specific waterbodies.

Appendix C
Stream and Waterbody Segmentation / Classification

CHAPTER 74:51:03

USES ASSIGNED TO STREAMS

Section
74:51:03:01 Beneficial uses of South Dakota streams to include irrigation and fish and wildlife propagation, recreation, and stock watering.
74:51:03:02 Beneficial uses of stream segments indicated by listings.
74:51:03:03 Segment boundaries described.
74:51:03:04 Minnesota River's tributaries' uses.
74:51:03:05 Missouri River and certain small tributaries' beneficial uses.
74:51:03:06 Bad River and certain tributaries' uses.
74:51:03:07 Big Sioux River and certain tributaries' uses.
74:51:03:08 Cheyenne River and certain tributaries' uses.
74:51:03:09 Battle Creek and certain tributaries' uses.
74:51:03:10 The Belle Fourche River and certain tributaries' uses.
74:51:03:11 Box Elder Creek and certain tributaries' uses.
74:51:03:12 Elk Creek and certain tributaries' uses.
74:51:03:13 Fall River and certain tributaries' uses.
74:51:03:14 French Creek and certain tributaries' uses.
74:51:03:15 Lame Johnny Creek and certain tributaries' uses.
74:51:03:16 Pleasant Valley Creek and certain tributaries' uses.
74:51:03:17 Rapid Creek and certain tributaries' uses.
74:51:03:18 Spring Creek and certain tributaries' uses.
74:51:03:19 Grand River and certain tributaries' uses.
74:51:03:20 James River and certain tributaries' uses.
74:51:03:21 Little Missouri River and certain tributaries' uses.
74:51:03:22 Moreau River and certain tributaries' uses.
74:51:03:23 Little Moreau River's uses.
74:51:03:24 Niobrara's tributaries' uses.
74:51:03:25 Vermillion River and certain tributaries' uses.
74:51:03:26 White River and certain tributaries' uses.
74:51:03:27 Red River of the North's tributaries' uses.

Cross-Reference: Definitions, § 74:51:01:01.

74:51:03:01. Beneficial uses of South Dakota streams to include irrigation and fish and wildlife propagation, recreation, and stock watering. All streams in South Dakota are assigned the beneficial uses of irrigation and fish and wildlife propagation, recreation, and stock watering. The classifications only designate the quality at which the waters are to be maintained and protected. Streams listed in this chapter may or may not be open to the public. Access to private property must be obtained from individual landowners.

Source: SL 1975, ch 16, § 1; transferred from § 34:04:04:01, effective July 1, 1979; 13 SDR 129, 13 SDR 141, effective July 1, 1987; transferred from § 74:03:04:01, July 1, 1996; 25 SDR 98, effective January 27, 1999.
General Authority: SDCL 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:03:02. Beneficial uses of stream segments indicated by listings. Additional beneficial uses assigned to stream segments listed in §§ 74:51:03:04 to 74:51:03:27, inclusive, are indicated by the number of the beneficial use classifications listed below. Unless otherwise indicated, the entire course of a named stream is the segment with the designated use. The beneficial use classifications are as follows:

(1) Domestic water supply waters;
(2) Coldwater permanent fish life propagation waters;
(3) Coldwater marginal fish life propagation waters;
(4) Warmwater permanent fish life propagation waters;
(5) Warmwater semipermanent fish life propagation waters;
(6) Warmwater marginal fish life propagation waters;
(7) Immersion recreation waters;
(8) Limited-contact recreation waters;
(9) Fish and wildlife propagation, recreation, and stock watering waters;
(10) Irrigation waters; and
(11) Commerce and industry waters.

Source: SL 1975, ch 16, § 1; transferred from § 34:04:04:02, effective July 1, 1979; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 14 SDR 86, effective December 24, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:04:02, July 1, 1996; 25 SDR 98, effective January 27, 1999.
General Authority: SDCL 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

Cross-References: Beneficial use of waters established, § 74:51:01:42; Beneficial uses of lakes indicated by listings, § 74:51:02:03.

74:51:03:03. Segment boundaries described. When section, range, and township are used in chapter 74:51:03 to describe the beginning or end point of a stream segment, the boundary of the segment is that point where the most downstream portion of the stream crosses the boundary of that section.

Source: 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; transferred from § 74:03:04:02.01, July 1, 1996.
General Authority: SDCL 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:03:04. Minnesota River's tributaries' uses. Stream segments covered by § 74:51:03:02 include the following tributaries of the Minnesota River:

Water Body	From	To	Beneficial Uses	County
West Fork Lac Qui Parle River, also known as Gary Creek	South Dakota border	S8, T115N, R47W of the fifth principal meridian.	3,8	Deuel
Florida Creek, also known as Cobb Creek	South Dakota border	S19, T115N, R47W	3, 8	Deuel
Jorgenson River	Little Minnesota River	S21, T124N, R50	6,8	Roberts
Monighan Creek	South Dakota border	S31, T116N, R48W	3,8	Deuel
Whetstone River	South Dakota-Minnesota border	the confluence of its north and south forks	5,8	Grant
North Fork Whetstone River	Whetstone River	S.D. Highway 15	6,8	Roberts
Substation Creek	North Fork Whetstone River	U.S. Highway 81	3,8	Roberts
South Fork Whetstone River	Whetstone River	S22, T120N, R51W	6,8	Grant
North Fork Yellow Bank River	South Dakota-Minnesota border	S27, T120N, R48W	4,8	Grant
South Fork Yellow Bank River	South Dakota-Minnesota Border	S33, T118N, R49W	3,8	Grant
Little Minnesota River	Big Stone Lake	S15, T128N, R52W	5,8	Roberts
Seiche Hollow Creek	Little Minnesota River	S36, T127N, R53W	3,8	Roberts

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; transferred from § 34:04:04:03, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 14 SDR 86, effective December 24, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:04:03, July 1, 1996; 24 SDR 10, effective July 20, 1997.

General Authority: SDCL 34A-2-93.

Law Implemented: SDCL 34A-2-10, 34A-2-11.

74:51:03:05. Missouri River and certain small tributaries' beneficial uses. Stream segments of the Missouri River and certain small tributaries covered by § 74:51:03:02 include the following:

Water Body	From	To	Beneficial Uses	County
Missouri River	Iowa Border	Big Bend Dam	1,4,7,8,11	Buffalo\Lyman
Missouri River	Big Bend Dam	North Dakota border	1,2,7,8,11	Campbell\Corson

Water Body	From	To	Beneficial Uses	County
American Creek	Lake Francis Case	Lake Wanalin	6,8	Brule
American Crow Creek	Lake Francis Case	U.S. Highway 16	6,8	Lyman
Bull Creek	Lake Frances Case	S23, T99N, R74W of the fifth principal meridian	6,8	Tripp
Artichoke Creek	Lake Oahe	S35, T117N, R79W	6,8	Sully
Cedar Creek	Lake Sharpe	S22, T108N, R76W	6,8	Lyman
Chapelle Creek	Lake Sharpe	S36, T111N, R75W	6,8	Hughes
Choteau Creek	Lewis and Clark Lake	S34, T96N, R63W	5,8	Charles Mix
Dante Creek	Choteau Creek	Dante Lake	6,8	Charles Mix
Dry Choteau Creek	Choteau Creek	S.D. Highway 50	6,8	Charles Mix
Crow Creek	Lake Francis Case	S18, T107N, R67W	5,8	Jerauld
Elm Creek	Crow Creek	West Fork Elm Creek	6,8	Buffalo
West Fork Elm Creek	Elm Creek	Stephan Lake	6,8	Hyde
Smith Creek	Crow Creek	Crow Lake	6,8	Jerauld
Emanual Creek	Lewis and Clark Lake	S20, T94N, R60W	5,8	Bon Homme
Little Cheyenne Creek	Lake Oahe	Lake Hurly	5,8	Potter
Medicine Creek	Lake Sharpe	U.S. Highway 83	6,8	Lyman
Medicine Knoll Creek	Lake Sharpe	confluence with its north and south forks	6,8	Hughes
North Fork Medicine Knoll Creek	confluence with South Fork Medicine Knoll Creek	S7, T114N, R74W	6,8	Sully
South Fork Medicine Knoll Creek	confluence with North Fork Medicine Knoll Creek	S16, T112N, R74W	6,8	Hughes
Oak Creek	Lake Oahe	S20, T21N, R28E	6,8	Corson
Okobojo Creek	Lake Oahe	U.S. Highway 83	6,8	Sully
Pease Creek	Lake Francis Case	Lake Geddes	6,8	Charles Mix
Platte Creek	Lake Francis Case	S21, T100N, R67W	6,8	Charles Mix
Ponca Creek	Nebraska border	U.S. Highway 183	5,8	Tripp
Willow Creek	Ponca Creek	S32, T96N, R70W	5,8	Gregory
Snake Creek (Charles Mix County)	Lake Francis Case	Lake Academy	6,8	Charles Mix
Snake Creek	Lake Oahe	Trail City R.R. Lake	6,8	Corson

Water Body	From	To	Beneficial Uses	County
(Corson County)				
Spring Creek	Lake Pocasse	U.S. Highway 83	5,8	Campbell
Spring Creek	U.S. Highway 83	State Highway 271	6,8	Campbell
Swan Creek	Lake Oahe	Rieger Creek	5,8	Walworth
Swan Creek	Rieger Creek	Swan Lake	6,8	Walworth
Rieger Creek	Swan Creek	S18, T122N, R76W	6,8	Walworth
South Fork Whetstone Creek	Lake Francis Case	Coon Creek	5,8	Gregory

Source: SL 1975, ch 16, § 1; 4 SDR 32, effective December 4, 1977; transferred from § 34:04:04:04, effective July 1, 1979; 10 SDR 145, effective July 4, 1984; 13 SDR 129, 13 SDR 141, effective July 1, 1987; 14 SDR 86, effective December 24, 1987; 19 SDR 111, effective January 31, 1993; transferred from § 74:03:04:04, July 1, 1996; 24 SDR 10, effective July 20, 1997.

General Authority: SDCL 34A-2-93.

Law Implemented: SDCL 34A-2-10, 34A-2-11.

Note: Certain other segments in the Missouri River Basin are covered in §§ 74:51:03:06 to 74:51:03:26, inclusive.

Appendix D
Treatment of Sediment
(not available)

Appendix E
Treatment of Biological

SOUTH DAKOTA

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Program Description

Currently, the South Dakota Department of Environment and Natural Resources (SD DENR) Water Resources Assistance Program (WRAP) collects biological data in addition to chemical and physical parameters for TMDL assessments. These bioassessments are useful in determining the impact of contaminants as well as detecting chronic water quality impairments that may not be discovered by ambient chemical and physical grab samples. Of the 9,937 total stream miles, approximately 4 miles have been biologically assessed (60 sites assessed; 150 meters per site). SD DENR has not yet established biological criteria for use in water quality standards.

The Water Resource Assistance Program evaluates benthic macroinvertebrate community structure in streams using both the EMAP protocol and USEPA's Rapid Bioassessment Protocols (RBPs) in conjunction with assessments of stream habitats. All biological samples are identified to the lowest possible level of taxonomic resolution. Biological data are entered into the STORET database and are summarized using multimetric indices and descriptive statistics. SD DENR intends to use the biological data to identify potential reference sites for determining the condition of water quality and the integrity of the biological community. WRAP is beginning to sample periphyton communities to determine if they are a better biological indicator of water quality.

Documentation and Further Information

Stueven, E., A. Wittmuss, and R.L. Smith. 2000. *Standard Operating Procedures for Field Samplers. Revision 4.0, January 2000.* South Dakota Department of Environment and Natural Resources, Water Resource Assistance Program. Pierre, SD.

Ecoregion Targeting of Impaired Lakes in South Dakota (May 2000)

The 2000 South Dakota Report to Congress, 305(b) Water Quality Assessment, http://www.state.sd.us/denr/Documents/SD_2000_305b.pdf

The 1998 South Dakota 303(d) Waterbody List and Supporting Documentation, http://www.state.sd.us/denr/303(d)/98sd303d.pdf

South Dakota Surface Water Quality Standards, http://legis.state.sd.us/rules/rules/7451.htm

SOUTH DAKOTA

Contact Information

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Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
	✓	promulgated into state water quality standards as biocriteria
		support of antidegradation
		evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
		other:
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(special projects, specific river basins or watersheds)*
		fixed station (i.e., water quality monitoring stations)
		probabilistic by stream order/catchment area
		probabilistic by ecoregion, or statewide
		rotating basin
		other:

Stream Miles

Total miles *(determined using RF3, National Hydrography Database, and state based determination)*	**9,937**
Total perennial miles	1,932
Total miles assessed for biology*	**3.73**
fully supporting for 305(b)	n/a
partially/non-supporting for 305(b)	n/a
listed for 303(d)	n/a
number of sites sampled *(on an annual basis)*	~60
number of miles assessed per site	~.093 *(150 meters)*

*South Dakota reports only chemical data in 305(b) reports and 303(d) listings. Currently, biological data is only collected during TMDL assessments. South Dakota's DENR plans to use the biological data to locate reference sites and conditions based on ecoregions as well as to establish biocriteria.

Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Warm Water vs. Cold Water	
ALU designations in state water quality standards	Five designations: Cold Water Permanent, Cold Water Marginal, Warm Water Permanent, Warm Water Semi-Permanent, Warm Water Marginal	
Narrative Biocriteria in WQS	No formal/informal numeric procedures exist to support narrative biocriteria	
Numeric Biocriteria in WQS	none	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
		cause and effect determinations
		permitted discharges
	✓	monitoring (e.g., improvements after mitigation)
	✓	watershed based management
Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	none	

Reference Site/Condition Development*

Number of reference sites	**~31 total**	
Reference site determinations *Under development*		site-specific
		paired watersheds
		regional (aggregate of sites)
	✓	professional judgment
		other:
Reference site criteria	Under development. Criteria used for defining reference sites include: EMAP protocol, habitat, chemical, and aquatic life.	
Characterization of reference sites within a regional context *Under development*		historical conditions
	✓	least disturbed sites
		gradient response
		professional judgment
		other:
Stream stratification within regional reference conditions *Under development*	✓	ecoregions (or some aggregate)
		elevation
		stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
		other:
Additional information *Under development*		reference sites linked to ALU
		reference sites/condition referenced in water quality standards
	✓	some reference sites represent acceptable human-induced conditions

*The responses above characterize how reference sites will most likely be determined in the future. Twenty-seven sites have been assessed in South Dakota as reference for the EMAP data set. South Dakota's DENR samples ~4 sites as reference and will be working on establishing formal reference sites and criteria for streams and rivers. Lake reference sites and criteria have already been developed.

Field and Lab Methods

Assemblages assessed	✓	benthos *(100 - 500 samples/year; single season, multiple sites - not at watershed level)*
		fish
	✓	periphyton *(<100 samples/year; single season, multiple sites - not at watershed level)*
		other:
Benthos		
sampling gear		D-frame, multiplate, rock baskets; 500 - 600 micron mesh
habitat selection		multihabitat
subsample size		300 count
taxonomy		combination
Periphyton		
sampling gear		**natural substrate**: brushing/scraping device (razor, toothbrush, etc.) **artificial substrate**: microslides or other suitable substratum
habitat selection		multihabitat
sample processing		chlorophyll *a* / phaeophytin, taxonomic identification
taxonomy		species level
Habitat assessments		visual based, quantitative measurements, hydrogeomorphology; performed with bioassessments
Quality assurance program elements		standard operating procedures, quality assurance plan, periodic meetings and training for biologists, taxonomic proficiency checks, specimen archival

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
		parametric ANOVAs
		multivariate analysis
	✓	biological metrics *(multimetric index under development)*
		disturbance gradients
		other:
Multimetric thresholds		
transforming metrics into unitless scores		25th percentile of reference population, natural breaks
defining impairment in a multimetric index		25th percentile of reference population
Evaluation of performance characteristics		repeat sampling
		precision
Not currently evaluated		sensitivity
		bias
		accuracy
Biological data		
Storage		STORET
Retrieval and analysis		Statistica, EDAS

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Appendix F
Naming Conventions

StoretID	Name	Waterbody	Date Started	Eco-Region	Directions	Lat.	Long.	County
46MN31	WQM MN31 - Annie Creek near Elmore.	Annie Creek	Jan-87	17c	From SD Hwy Alt 14A at Elmore north on gravel road #215 approximately 1.5 miles to old rail grade crossing Annie Creek. Station is at east side, center culvert. In 1999, station was moved to site 1 mile from Elmore turnoff on Highway 14A - USGS gauge.	44.331	-103.9	LAWRENCE
460850	WQM 29 - Bad River near Fort Pierre	Bad River	Apr-68	43c	On first bridge on Bad River Road, about 1.6 miles southwest of junction with US Hwy 83.	44.326	-100.4	STANLEY
460103	WQM 103 - Battle Creek near Keystone.	Battle Creek	Oct-79	17b	At first east-west bridge on Old Hill City Road west of US Hwy 16 and SD Hwy 40 junction.	43.894	-103.4	PENNINGTON
460905	WQM 17 - Battle Creek near Hayward.	Battle Creek	May-68	17b	At east-west SD Hwy 40 bridge just west of Hayward, approximately 4 miles southeast of Keystone.	43.872	-103.3	PENNINGTON
460125	WQM 125 - Bear Butte Creek below Galena	Bear Butte Creek	Aug-98	17b	At bridge on Galena Road at junction with Butcher Lane.	44.333	-103.6	LAWRENCE

460126	WQM 126 - Bear Butte Creek above Galena	Bear Butte Creek	Aug-98	17b	On Galena Road about 0.2 miles from the junction with FS Road 534. Across the road from a house.	44.317	-103.6	LAWRENCE
460128	WQM 128 - Beaver Creek near Burdock	Beaver Creek	Apr-99	43e	North-south gravel road bridge west of Burdock, 2 miles above confluence with Cheyenne River	43.449	-104	FALL RIVER
460130	WQM 130 - Belle Fourche River in Belle Fourche	Belle Fourche River	Jan-99	43g	Approximately 500 feet downstream of north-south US Hwy 85 bridge in Belle Fourche	44.675	-103.9	BUTTE
460880	WQM 21 - Belle Fourche River near Volunteer.	Belle Fourche River	Jun-67	43g	At east-west SD Hwy 34 bridge, approximately 20 miles northeast of Sturgis, and 16.5 miles NE of the junction of Highways 34 and 79.	44.514	-103.1	MEADE
460676	WQM 76 - Belle Fourche River northwest of Elm Springs	Belle Fourche River	Sep-76	43c	At north-south bridge on Elm Springs Road (Meade County Road 31) between Enning and Elm Springs. 5 miles north of Elm Springs	44.37	-102.5	MEADE

Appendix G
303(d) example

Basin Name	Waterbody	Location	Map ID (App. A)	Source of Data for Listing	Beneficial Use	Reason for Listing	TMDL Priority
	Ponca Creek	Near Gregory	P59	Discharge permit SD0022179	5-8-9-10	Renewal of discharge permit with ammonia effluent limits	1
	Spring Creek	US Hwy 83 to mouth	S24	Monitoring Site DENR460155	5-8-9-10	Dissolved Oxygen	3
		Near Herreid	P60	Discharge permit SD0022900	5-8-9-10	Renewal of discharge permit with ammonia effluent limits	1
	Swan Creek	Near Akaska	P61	Discharge permit SD0022250	5-8-9-10	Renewal of discharge permit with ammonia effluent limits	1
	Lakes						
	Academy Lake	Charles Mix County	L40	Lake assessment	4-7-8-9	TSI=81	1
	Lake Andes	Charles Mix County	L41	Lake assessment	6-7-8-9	TSI=92	1
	Brakke Dam	Lyman County	L42	Lake assessment	4-7-8-9	TSI=68	1
	Burke Lake	Gregory County	L43	Lake assessment	5-7-8-9	TSI=77	1
	Cottonwood Lake	Sully County	L44	Lake assessment	5-7-8-9	TSI=74	3
	Corsica Lake	Douglas County	L45	Lake assessment	5-7-8-9	TSI=80	1
	Dante Lake	Charles Mix County	L46	Lake assessment	4-7-8-9	TSI=69	1
	Fate Dam	Lyman County	L47	Lake assessment	4-7-8-9	TSI=64	1
	Geddes Lake	Charles Mix County	L48	Lake assessment	5-7-8-9	TSI=81	1
	Platte Lake	Charles Mix County	L49	Lake assessment	6-7-8-9	TSI=79	1
	Lake Pocasse	Campbell County	L50	Lake assessment	4-7-8-9	TSI=86	3
	Roosevelt Lake	Tripp County	L51	Lake assessment	4-7-8-9	TSI=69	3
	Sully Dam	Tripp County	L52	Lake assessment	5-7-8-9	TSI (Based on 1998 listing)	3
	Sully Lake	Sully County	L53	Lake assessment	6-7-8-9	TSI=78 pH	3
Moreau River Basin	**Streams**						
	Moreau River	Headwaters to near Iron Lightning	S25	Monitoring Site DENR460039	5-8-9-10	Suspended solids	3
		Green Grass to mouth	S26	Monitoring Site DENR460935	5-8-9-10	Sodium adsorption ratio Suspended solids	3
	Thunder Butte Creek	Near Bison	P62	Discharge permit SD0022411	6-8-9-10	Renewal of discharge permit with ammonia effluent limits	1
	Lakes						

Table 10. Waterbodies From 1998 303(d) List to be Delisted

Basin Name	Waterbody	Location	Parameter	Information to Support De-Listing	EPA Approved
Bad River Basin	Bad River	Headwaters to Stanley County line	Accumulated sediment	EPA Approved TMDL	02/07/01
		Midland (SD-0020630)	Ammonia	EPA Approved TMDL	11/09/98
		Philip (SD-0020303)	Ammonia	EPA Approved TMDL	09/25/98
	Freeman Lake	Jackson County	Nitrates, Selenium	EPA Approved TMDL	02/7/01
	Murdo Dam	Jones County	TSI, Trend	New information indicates full support	N/A
Belle Fourche River Basin	Bear Butte Creek	Headwaters to Lawrence County line	Cadmium, Copper, Zinc	New information indicates full support	N/A
	Redwater River	Spearfish (SD-0020044)	Ammonia	New modeling information indicates no TMDL required in order to maintain water quality standards	N/A
	Cleopatra Creek, Spearfish Creek	LAC (SD-0026883)	Metals	New modeling information indicates no TMDL required in order to maintain water quality standards	N/A
	Whitewood Creek	Above Gold Run Creek	pH	New information indicates full support	N/A
		Homestake Mining Co. (SD-0000043)	Ammonia, metals	EPA Approved TMDL	03/23/99
		Ridley Block Co. (SD-0026166) Whitewood (SD-0021466)	Ammonia	EPA Approved TMDL	11/20/01
	Whitewood Creek and Deadwood Creek	Homestake Mining Co. (SD-0025933)	Metals	New modeling information indicates no TMDL required in order to maintain water quality standards	N/A
	Strawberry Creek	Headwaters to mouth	TSS, Lead, pH, Zinc	New information indicates full support	N/A
Big Sioux River Basin	Beaver Creek	Valley Springs (SD-0020923)	Ammonia	EPA Approved TMDL	09/25/98
	Big Sioux River	Brookings (SD-0023388)	Ammonia, Dissolved Oxygen	EPA Approved TMDL	06/28/99
		Canton (SD-0022489)	Ammonia	EPA Approved TMDL	08/19/99
		Dell Rapids (SD-0022101)	Ammonia	EPA Approved TMDL	02/07/01
		Egan (SD-0022462)	Ammonia	EPA Approved TMDL	11/20/01

Appendix H
Assessment Protocols for Listing and Delisting

LISTING APPROACH AND METHODOLOGIES

Specific criteria were developed and used to determine which waterbodies should be placed on the 2002 list. These criteria were developed based on section 303(d) of the federal Clean Water Act, EPA guidance, department priorities and objectives, public input, and other important factors. A discussion of the approaches and methodologies used to develop the 2002 list is included below.

Types of Waters Listed

The following information and data sources were used to determine which waterbodies should be included on the list, based on the requirements of section 303(d) of the federal Clean Water Act:

- Waters included in the most recent 305(b) report (the 2002 Water Quality Assessment - Report to Congress) identified as "not supporting" or "partially supporting";
- Waters for which modeling indicates nonattainment of water quality standards;
- Waters for which documented water quality problems have been reported by local, state, or federal agencies; the general public; or academic institutions; and
- Waters that receive discharges from point sources where water quality-based effluent limits are required to maintain surface water quality standards.

Impaired Waters

Waters that are considered impaired for meeting beneficial uses or water quality standards are required to be placed on the 303(d) list. This includes waters which are identified under the "not supporting" or "partially supporting" beneficial use categories in the 2002 305(b) report prepared by DENR. Waters designated as such in the 305(b) report are included in the 2002 303(d) list unless the waterbody has a recent TMDL approved by EPA that addresses the impairments.

Waters with Surface Water Discharge-Related Wasteload Allocations

In December 1993, DENR was delegated authority to administer the National Pollutant Discharge Elimination System. At that time, EPA withheld program authorization within Indian Country. DENR's program is called the Surface Water Discharge Program. Surface Water Discharge permits are used to control discharges of pollutants from point sources. Most Surface Water Discharge permits contain technology-based effluent limits, which are usually attained using the best available technology that is economically achievable. In cases where technology-based limits are not sufficient to protect water quality standards, water quality-based effluent limits are incorporated into permits via

wasteload allocations. In many cases, the development and implementation of water quality-based limits includes the development of a TMDL for the receiving water. The portion of the TMDL allocated to the point source discharger is the "wasteload allocation". The portion of the TMDL allocated to upstream background sources is the "load allocation". Most Surface Water Discharge permits are issued for a duration of five years, after which the effluent limits and TMDL are re-evaluated. Although the 303(d) listing cycle is expected to be four years in duration, for the sake of completeness, all TMDLs related to Surface Water Discharge permits are listed in the 2002 303(d) list, not just those expiring between October 1, 2002 and September 31, 2006.

Waters with Surface Water Discharge-related TMDLs fall into the category of waters *"for which dilution calculations or predictive modeling indicate nonattainment of water quality standards."*

This does not mean that the waterbody segment to which any particular Surface Water Discharge permittee discharges is impaired. It simply means that without water quality-based limits, predictive modeling would indicate probable impairment. Most segments for which Surface Water Discharge-related TMDLs are being developed are in fact **not impaired,** because the majority of these TMDLs are already in place, and are merely being updated during this four year time-frame.

Waters Reported by Government Agencies; Members of the General Public; or Academic Institutions

Through DENR's existing water quality programs and public participation, additional waters were considered for inclusion on the 303(d) list. The DENR received comments on specific waterbodies that should be included on the list from organizations and citizens solicited during the public participation period. In cases where water quality problems were reported or DENR had data that showed impairment, but the water was not listed, the basis for such exclusion is given (Table 10.)

Minimum Data Requirements

To ensure that each listing is defensible, the DENR established minimum requirements for the data to be used as a basis for listing. Waters were listed that met all of the following criteria:

- Age of data was five years or less for streams and beaches, and ten years or less for lakes, unless there was adequate justification to use older data;
- Lakes must have been sampled in at least two separate years within the ten-year period;
- Data collected through instantaneous and grab sampling or expressed as a geometric mean met minimum sampling requirements as specified in the South Dakota Surface Water Quality Standards; and

- Data collection and analyses followed established department Quality Assurance/Quality Control (QA/QC) standards as defined in "Standard Operating Procedures for Field Samplers," South Dakota Department of Environment and Natural Resources, January 2000 or met minimum QA/QC as defined by the responsible agency.

Water quality problems reported by other agencies, institutions, and the public had to be accompanied by data which met the above requirements or be confirmed by DENR data.

PRIORITIZATION OF TMDL WATERS

Regulatory Requirements

Section 303(d) of the federal CWA requires that *"each state shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters."* Little other guidance is offered for states to use in the prioritization process.

A system of prioritization has been developed by DENR based on several factors. Included in these factors are the required elements of *"the severity of the pollution and the uses to be made of such waters."* The methods developed are described below. These criteria are a guide. If a water met any one criteria in a category, that did not necessarily mean the water was prioritized as such, since many waters fit some criteria from all categories.

Table 7. TMDL Prioritization Criteria

Priorities	Applicable Criteria
Priority 1 (High)	• Waters with expiring Surface Water Discharge permits; • Imminent human health problems; • Waters where TMDL development is expected over the next four years; • Waters listed for four or more listing criteria; or • Waters with documented widespread local support for water quality improvement.
Priority 2 (Medium)	• Waters with an increasing trend towards eutrophy or enrichment, with consideration given to the rapidity of the declining water quality; • Waters listed for three listing criteria; • Waters where local support for TMDL development is expected but not documented; or • Water listed for aquatic life impairment.
Priority 3 (Low)	• Waters listed for two or less listing criteria; • Waters with no evident local support for water quality improvements; or • Waters where impairments are believed to be due largely to natural causes.

Section 319-Related Waters

Section 319 TMDL assessments are developed based upon the prioritization criteria listed above. Implementation projects for TMDLs hinge upon whether adequate local support exists.

Surface Water Discharge-Related Waters

By federal law, Surface Water Discharge Permits cannot be issued with a permit life greater than five years. One hundred eighty (180) days prior to permit expiration, a discharger must apply for a renewal of their permit. By rule, permit renewals are prepared and public noticed by DENR in the same manner as in the case of a new application. Surface Water Discharge-related TMDLs are considered a high priority in South Dakota.

The majority of parameters for which Surface Water Discharge-related TMDLs are developed include ammonia and dissolved oxygen. As can be seen from the following proposed 2002 303(d) list, very few streams have impairments for ammonia and dissolved oxygen. The priorities for Surface Water Discharge-related TMDLs are therefore based very little on the severity of waterbody impairment, or the uses to be made of the waters, but, rather, largely upon federal requirements to renew these discharge permits and the importance of maintaining the past water quality improvements made through the permits.

PUBLIC PARTICIPATION PROCESS

To fulfill the requirements of the federal Clean Water Act, and involve the affected community and stakeholders in the water quality improvement process, a public participation process was implemented. Summarized below are the procedures employed by DENR to involve the public.

Process Description

First Public Review/Input Period

On or around August 1, 2001, an ad was published in 11 statewide daily newspapers and *Indian Country Today*, announcing the DENR was developing the 2002 303(d) list and requesting water quality data that would aid in the identification of waters that should be added, removed, or remain on the list. This announcement was also sent to approximately 70 individuals and organizations.

Second Public Review Period

Data received after the first public review period, and additional data gathered by DENR were reviewed, and a draft list was developed. The draft list was released for a 30-day public review and comment period in late July 2002. The announcement on the availability of the draft list was again published in the 11 daily newspapers and *Indian Country Today.* The draft list was also made available on DENR's web page at: **http://www.state.sd.us/denr/denr.html.** At this time, the draft list was also provided to USEPA Region VIII for review and comment.

Personnel from DENR responded to inquiries and were available to meet with interested groups about the list and listing process. Copies of public participation documents and

responses to oral and written comments received during the comment period are included in Appendix B.

LISTING OF TMDL WATERS

This section is the core of the 2002 TMDL list. A listing of each waterbody that will be considered for a TMDL, including the basis for listing, priority, pollutants of concern, and other important information are compiled here. All other sections of this document are in support of this list, either to explain the rationale and decisions made to develop this list or to support its development.

DELISTING OF CERTAIN 1998 TMDL WATERS AND OTHER EXCLUSIONS

A table of delisted waters (Table 10 below) was developed using the following criteria:

- EPA-approved TMDL(s) in place for all pollutants of concern;
- Water quality standards now being met because:
  - New monitoring data show attainment; or
  - New-modeling results show no potential for exceedence of standards.
- Water was listed in error;
- Additional state effluent controls address water quality problems;
- Reservoirs have been breached and are no longer a viable waterbody; or
- Data assessment methodologies have been modified.

XX) Appendices Map

Main Website: http://www.state.sd.us/denr/DES/Surfacewater/surfwprg.htm

Appendix A – Found in the South Dakota Total Maximum Daily Load Waterbody List 2002 at http://www.state.sd.us/denr/DES/Surfacewater/IPermits/2002_303(d).pdf See pages 10 through 12.

Appendix B – Found in two sources each with different formats:

- the South Dakota Total Maximum Daily Load Waterbody List 2002 at http://www.state.sd.us/denr/DES/Surfacewater/IPermits/2002_303(d).pdf See pages 8 through 9.

- Found in the Surface Water Quality Standards Chapter 74:51:01 at http://legis.state.sd.us/rules/rules/7451.htm#74:51:01 See pages 22-29 and Appendix B

Appendix C – Found in the Uses assigned to streams Chapter 74:51:03 at http://legis.state.sd.us/rules/rules/7451.htm#74:51:03 See section 74:51:03:26, pages 61-65

Appendix D – not available

Appendix E – Found on a PDF created by the EPA entitled "Summary of Bioassessment Programs and Biocriteria Development" – Dec. 2002. http://www.epa.gov/bioindicators/pdf/SD_summary_final.pdf

Appendix F – Found at the Surface Water Sites page of the Water Quality Monitoring Network http://www.state.sd.us/denr/DES/Surfacewater/WQMList.htm

Appendix G– Found in the South Dakota Total Maximum Daily Load Waterbody List 2002 at http://www.state.sd.us/denr/DES/Surfacewater/IPermits/2002_303(d).pdf
- See pages 20 and 35

Appendix H – Found in the South Dakota Total Maximum Daily Load Waterbody List 2002 at http://www.state.sd.us/denr/DES/Surfacewater/IPermits/2002_303(d).pdf
- See pages 6-20, and 34

The Clean Water Act: UTAH

I) DWQ and State Review Process

DIVISION OF WATER QUALITY
288 North 1460 West (Cannon building) 3rd floor
Box 144870
Salt Lake City, Utah 84114-4870
Telephone: 538-6146 FAX: 538-6016

Mission:

Protect, maintain and enhance the quality of Utah's surface and underground waters for appropriate beneficial uses; and to protect the public health through eliminating and preventing water related health hazards which can occur as a result of improper disposal of human, animal or industrial wastes while giving reasonable consideration to the economic impact.

The **Water Quality Board** consists of the following members, who were appointed to represent the various users of water in the state:

Name	Political Party	Representation	Term Expires*
K.C. Shaw, Chair	R	Other manufacturing industries First appointed 4/19/95	3/1/03
William R. Williams, Vice-Chair	R	Minerals Industry First appointed 6/18/97	3/1/05
Robert G. Adams	R	Food processing industry First appointed 3/1/97	3/1/05
Ray M. Child	NP	Improvement and Service districts First appointed 4/l5/99	3/1/03
Nan W. Bunker	R	Agricultural and livestock interests First appointed 8/l7/94	3/1/03
Neil K. Kochenour, M.D.	D	Fish, wildlife and recreation interests First appointed 6/00	3/1/05
Ronald C. Sims USU Water Research lab	D	One of two members at large chosen to represent areas of the state affected by water pollution First appointed 4/19/95	3/1/03

Mayor Joseph Piccolo Price City	NP	Municipal Government First appointed 11/02	3/1/05
Mayor Douglas E. Thompson Logan City	NP	Municipal Government First appointed 4/22/98	3/1/03
J. Ann Wechsler	D	One of two members at large, one who represents organized environmental interest, chosen to represent areas of the state affected by water pollution First appointed 2/28/96	3/1/05
Dianne R. Nielson DEQ Executive Director	NP	DEQ Appointed 1/4/93	n/a

***Board member may serve for 90 days beyond term expiration date.**

Schedules of upcoming board meetings and minutes of past meetings are available at http://www.deq.utah.gov/EQOAS/CALENDAR/boardmeetings.htm

Public hearings will be held to review all proposed revisions of water quality standards, designations and classifications, and public meetings may be held for consideration of discharge requirements set to protect water uses under assigned classifications.

Public participation in decision and policy making is important in both the water quality regulation and standards review process and the designation of water quality standards to certain bodies of water throughout the state. An example of public participation in decision-making follows:

Public participation in developing the impaired water list (303(d)) list in 2002 was primarily in the form of technical advisory and steering committees that consisted of other State agencies, Federal agencies, and individuals or groups from the private sector. Some committees actively participated in preparing the list while presentations of the assessments were given to others. Comments by the groups were then reviewed to assist in preparing the list.

Notice of the proposed list of 303(d) waters was published in the Salt Lake City Tribune and the Deseret News on February 27, 2002. The comment period was extended for one week beyond the original 30-day comment period. In addition, the draft 303(d) list was placed on the Division of Water Quality's website for access by the public. The Division's response to any comments was submitted with the list.

Information and links for water quality rules which are currently under revision can be found at http://www.waterquality.utah.gov/Rules/rulechange.htm. The official publication for announcing such changes is the Utah State Bulletin, published on the 1st and 15th of each month by the Division of Administrative Rules and available on their web site

rules.utah.gov .

Triennial Review:

The Triennial Review Process is one in which the DWQ reviews the water quality and standards of its watersheds, as all states are required to do by the EPA. The actual schedule of reviewing each watershed of Utah can be found by contacting the DWQ.

Last Hearing: Mid 2003. Utah completed its triennial review in July 2003. Changes are expected to be effective December 2003. Utah is expecting to adopt E. coli as the bacteriological standard in early 2004.

Next Hearing: Not yet scheduled, due in 2006

II) Contacts

Water Quality Standards
William Moellmer, Ph.D.
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wmoellmer@utah.gov

NPDES
Gayle Smith
(801) 538-6779
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TMDLs
Harry Judd
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Section 401
William Moellmer, Ph.D.
(801) 538-6329
wmoellmer@utah.gov

To get on an agency's mailing list for:

Proposed Water Quality Rule Changes
William Moellmer, Ph.D
Division of Water Quality
288 N. 1460 W.
Box 144870
Salt Lake City, UT 84114-4870
(801) 538-6329
mfugate@utah.gov

Mail a request or send an email.

NPDES Permits

Edith Van Vleet
Division of Water Quality
288 N. 1460 W.
Box 144870
Salt Lake City, UT 84114-4870
(801) 538-9210
evanvleet@utah.gov

Mail a request or send an email.

Triennial Review Hearings
William Moellmer, Ph.D
Division of Water Quality
288 N. 1460 W.
Box 144870
Salt Lake City, UT 84114-4870
(801) 538-6329
mfugate@utah.gov

Mail a request or send an email.

III) List of Designated Uses

The Board as required by Section 19-5-110, groups the waters of the state into classes so as to protect against controllable pollution the beneficial uses designated within each class as set forth below. Surface waters of the state are hereby classified as shown in R317-2-13.

1) 6.1 Class 1 -- Protected for use as a raw water source for domestic water systems.
    a. Class 1A -- Reserved.
    b. Class 1B -- Reserved.
    c. Class 1C -- Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water

2) 6.2 Class 2 -- Protected for recreational use and aesthetics.
    a. Class 2A -- Protected for primary contact recreation such as swimming.
    b. Class 2B -- Protected for secondary contact recreation such as boating, wading, or similar uses.

3) Class 3 -- Protected for use by aquatic wildlife.
    a. Class 3A -- Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
    b. Class 3B -- Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
    c. Class 3C -- Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain.

d. Class 3D -- Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
e. Class 3E -- Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.

4) Class 4 -- Protected for agricultural uses including irrigation of crops and stock watering.

5) 6.5 Class 5 -- The Great Salt Lake. Protected for primary and secondary contact, recreation, aquatic wildlife, and mineral extraction.

For criteria used to determine if water quality for beneficial uses are met, see Appendix A.

IV) Water Quality Classified Uses and Antidegradation Policy

For Utah's Classified Uses and Antidegradation Policy see a separate document entitled "Antidegradation Policies by State."

V) Basic Standards / Criteria

Numeric

The numeric criteria listed in R317-2-14 shall apply to each of the classes assigned to waters of the State as specified in R317-2-6. It shall be unlawful and a violation of these regulations for any person to discharge or place any wastes or other substances in such manner as may interfere with designated uses protected by assigned classes or to cause any of the applicable standards to be violated, except as provided in R317-1-3.1. The Board may allow site specific modifications based upon bioassay or other tests performed in accordance with standard procedures determined by the Board.
For the numeric standards of high quality waters of the state see Appendix B.

Narrative

It shall be unlawful, and a violation of these regulations, for any person to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum or other nuisances such as color, odor or taste; or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by bioassay or other tests performed in accordance with standard procedures.

VI) Assessment Protocols Used to Determine Standards

VII) Stream Segmentation System

Streams in the state are segmented according to their use designations and accompanying standards. A table located in the Standards of Water Quality for Waters of the State identifies waterbody segments and use designations as listed above.

For an example list of stream segment use designations see Appendix C.

VIII) Treatment of Water Column

The quality of the water column is subject to both narrative and numeric standards as listed above in V) Basic Standards/Criteria and shown in Appendix B. These criteria are applied to sections of watersheds based on their use, as shown in Appendix C.

IX) Treatment of Physical Habitat

Biological and habitat data are used on a limited basis to supplement water chemistry data in determining beneficial use support. The reason for using habitat and biological data (e.g., benthic macroinvertebrate data) as supplemental evaluations is because the State has not developed metrics or regional metric criteria for use in evaluating beneficial use support using these types of data. Phytoplankton data were used to assess lake and reservoir water quality.

X) Treatment of Sediment

Not available.

XI) Treatment of Biological

Narrative Standards - "It shall be unlawful, and a violation of these regulations, for any person to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum or other nuisances such as color, odor or taste; or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by bioassay or other tests performed in accordance with standard procedures."

Biological and habitat data were used on a limited basis to supplement water chemistry data in determining beneficial use support. The reason for using habitat and biological data (e.g., benthic macroinvertebrate data) as supplemental evaluations is because the State has not developed metrics or regional metric criteria for use in evaluating beneficial use support using these types of data. Phytoplankton data were used to assess lake and reservoir water quality.

Prior to 2001, The Utah Division of Water Quality (DWQ) Biological Assessment program was limited to benthic macroinvertebrate data collected at 18 long-term monitoring sites. They have been sampled since 1978 with the exception of about five years in which the allocation of the 18 samples were used to supplement water chemistry and physical data collected in the five-year basin rotation monitoring plan. These samples were collected to ascertain long-term water quality and to be used in determining trends. In addition, benthic macroinvertebrate samples were collected at 16 Nonpoint Source Project sites to assess the effects of BMP implementation. These data have been incorporated into several NPS reports to determine what improvements in water quality have occurred. Data collected from the 18 long-term monitoring sites and the NPS projects have been used in making beneficial use assessments (305(b)) and listing waters on the 303(d) list.

In 2001, the DWQ reviewed its bio-monitoring program and decided that a major effort was needed to improve and develop new components of its water quality assessment program. During this review, an inventory of benthic macroinvertebrate data collected by DWQ, the U.S. Bureau of Land Management (BLM), and the U.S. Forest Service (USFS) was completed. Upon completion of this review, the DWQ contacted the BLM and USFS and requested all of the benthic macroinvertebrate data that they had collected from 1990 through 1997 be sent to DWQ for entering into STORED. These data, along with DWQ's, were entered into STORET. Data collected since 1997 have been stored electronically and a program to electronically transfer these data into STORET is being developed. These data will be evaluated as to their usefulness in establishing reference sites and the development of metrics to be used in assessing beneficial use support. In 2001, the DWQ negotiated an agreement to complete the E-MAP sampling for EPA within the State. Experience obtained from this work would allow environmental scientists (field and staff) to learn and evaluate the methods used in the E-MAP protocol. This experience could then be used to develop a bioassessment protocol for assessing waters within the State.

Concurrent with doing the E-MAP work, the Division decided to commit additional resources to develop reference sites for bioassessment work. It was decided that the DWQ would select and try to sample up to 60 potential reference sites during the next 2-3 years. Water chemistry, fish, benthic macroinvertebrate, periphyton, and physical habitat data will be collected at these sites. The selection of sites was based upon the different ecoregions within the state and the need for low elevation, low-gradient stream reference sites. DWQ is also assisting the EPA Corvallis Lab in reviewing and selecting reference sites that were initially selected using GIS techniques. Approximately 100 sites were initially selected and the number has been reduced to 20 sites. The DWQ is assisting in sampling these sites. Information obtained from this program will be evaluated and possibly incorporated into the Division's bioassessment program. The DWQ has committed to developing a set of reference sites and metrics that can be used to ensure that the waters of the State are assessed in a scientifically sound and standard method. Work is also going on to evaluate other assessment methods such as RIVPACS in assessing beneficial use support.

For more specifics on the biological assessment of waters in Utah see Appendix E.

XII) Treatment of Wetlands

For information on the Treatment of Wetlands in Colorado, see a separate document entitled "Treatment of Wetlands by State."

XIII) 305b Reports

Section 305(b) of the Clean Water Act requires that states, territories, and jurisdictions assess their water quality biennially and report those findings to the U.S. Environmental Protection Agency (EPA). EPA then summarizes the findings in a national water quality inventory. It is important to note that this report is no longer a Report to Congress, pursuant to Public Law 104-66, the Federal Reports Elimination and Sunset Act of 1995. To assess water quality, states and other jurisdictions compare their monitoring results to the water quality standards they have set for their waters. Water quality standards consist of three elements: the designated uses assigned to waters (such as drinking, swimming, or fishing), criteria to protect those uses (such as chemical-specific thresholds that should not be exceeded), and an antidegradation policy intended to keep waters that *do* meet standards from deteriorating from their current condition.

This data is compiled into the National Water Quality Inventory biennially. The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

Utah's 2002 305(b) report can be found at
http://www.waterquality.utah.gov/documents/full_2002305b.pdf

The 2002 National Water Quality Inventory is the latest report available and can be accessed at www.epa.gov/305b/2000report/alhi.pdf

XIV) 303d lists

Section 303(d) of the federal Clean Water Act (and related regulations requires states to assess the condition of their waters to determine where water quality is impaired (does not fully meet standards) or threatened (is likely to violate standards in the near future). The result of this review is the 303(d) list, which must be submitted to the EPA every other year. Section 303(d) also requires states to prioritize and target water bodies on their list for development of water quality improvement strategies (i.e. TMDLs), and to develop such strategies for impaired and threatened waters.

In considering whether or not applicable water quality standards are being met, the state should not only consider the narrative and numeric criteria set forth in the standards to protect specific uses, but also the classified uses defined for the waterbody and whether the use or uses are fully supported or not supported due to any pollutant source or cause. Therefore, a waterbody could be considered water quality limited when it can be demonstrated that a beneficial use (e.g., aquatic life or recreation) is impaired even when there are no demonstrated exceedences of either the narrative or numeric criteria. Even when there is use impairment and no exceedence of the numeric standard the

state should provide information as to the cause of the impairment. Where the specific pollutant (e.g., copper or phosphorus) is unknown a general cause category (e.g., metals or nutrients) should be included with the waterbody listing.

Utah's 303(d) waterbodies are listed by the Watershed Management Unit in which they are located (ex) Bear River. Other column headings in the table include:

- Waterbody ID
- Waterbody Name
- Waterbody Description
- HUC Unit Number
- Beneficial Use Class
- Perennial Stream Miles
- Cause (for not meeting beneficial use criteria)
- New 303(d) Water (year given if newly listed)
- Priority for TMDL (low to high or year required for priority listing)
- Targeted for TMDL (yes/no or when submitted)

The state of Utah relied upon the following sources of data and information to prepare its 303(d) list.

A. Water Quality Assessments

Water Quality Monitoring Regions.

1) Bear River, Weber River, Great Salt Lake Desert/Columbia (northern portion of the GSL Desert)

2) Jordan River, Great Salt Lake Desert (southern portion of Great Salt Lake)

3)Uinta

4)Sevier River, Cedar/Beaver, Lower Colorado

5)West Colorado River, Southeast Colorado River

B. Dilution Equations

C. Reports

D. Nonpoint Sources Assessments

Utah's 2002 303(d) list can be found at
http://www.waterquality.utah.gov/documents/2002303final08-30-02.pdf

This list included 313 UPDES permit renewals, 82 lakes and reservoirs and 72 river and stream segments. The 303(d) list is a dynamic list in which waterbodies can be added (i.e. new permits are issued, new assessments are made) or removed (i.e. water quality standards are now being met).

For an example page of the 303(d) list see Appendix G

XV) Assessment protocols for listing and delisting

EPA will review and approve, partially approve/disapprove, or disapprove state or territorial 303(d) lists of impaired and threatened waters requiring a TMDL (Category 5). EPA's review and approval of the 303(d) list will be based on a determination that the state's or territory's assessment and listing methodology was used to prepare the list, that the assessment and listing methodology is scientifically sound, that it is consistent with the state's or territory's water quality standards, and that the state or territory reasonably considered all existing and readily available data and information, and listed all waters not attaining water quality standards. Upon completing its review of the 303(d) list, EPA will send a letter to the state or territory notifying it of full approval, partial approval/disapproval, or disapproval. If the list is partially approved/disapproved, or disapproved, EPA will develop a list for the state or territory. EPA will also provide 30 days for public comment on the EPA developed list.

The decision-making process used to identify and list water quality-limited waterbodies needing TMDLs can be found in the intro to the 303(d) list and is as follows. The criteria used to list as well as to de-list waterbodies previously identified in the State's 2000 TMDL list are also contained in the 2002 303(d) list but are not included here due to their extensiveness.

Division of Water Quality Programs Involved In Identifying Impaired Waters:

1) Utah Pollutant Discharge Elimination System Program (UPDES) - Any receiving waterbody (lake, reservoir, river, stream) on which a facility is located that requires a Utah Pollutant Discharge Elimination System discharge permit renewal between April 1, 2002 and March 31, 2004 for pollutants that are not controlled through technology-based requirements or end-of-pipe requirements was listed. The waterbodies identified and associated with the UPDES permit dischargers are water quality limited which means a TMDL is needed to determine proper water quality-based limits to assure water quality standards are maintained or attained. Listing of permittees and pollutants doesn't imply that the receiving water is currently violating any of the State's water quality standards. Total Maximum Daily Load Analyses are calculated to determine the degree of treatment which must be performed before the effluent can be discharged to assure the receiving water quality and its beneficial use designations are maintained.

2) Lake Water Quality Assessment and Clean Lakes Programs (314) - Any lake or reservoir identified as partially supporting or not supporting one or more of its beneficial uses through either one of these programs was evaluated for listing.

3) Stream Water Quality Assessment and Nonpoint Source Programs (319) - Any stream or stream segment identified as partially supporting or not supporting one or more of its beneficial uses through either one of these programs was evaluated for listing.

4) Cooperative Monitoring Program - The Division of Water Quality has Memorandums of Agreement with the U.S. Forest Service and U.S. Bureau of Land Management to cooperate in the monitoring of the waters of the State. Agreements have also been made with other entities to monitor and collect data to be used in assessing waters for preparation of the 303(d) list. Any waterbody identified using data from the cooperative monitoring program as not meeting its beneficial uses was evaluated for listing.

For more details concerning Utah's 303(d) listing and delisting procedures see Appendix H.

XVI) Assessment for National Point Source Discharge Elimination System (NPDES) permits

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

Utah is a delegated permit authority.

Permits that may be issued include:

- **Surface Water Discharge Permits:**
  Discharging waste water to surface waters, including storm drains, requires a permit prior to beginning operations. Utah Pollutant Discharge Elimination System (UPDES) Permits are required for all industrial, municipal and federal facilities, except those on Indian lands.

- **Construction permits:**
  Facilities treating waste water may need construction permits unless they discharge into a municipal sanitary sewer system.

- **Indirect Discharges (to municipal sanitary sewers):**
  A state permit is needed to discharge into sewers if the municipality or sewer district does not have a state approved pre-treatment program or authority to issue its own permits.

- **Storm Water Permits:**
  Discharge permits are required from most industries that discharge storm water runoff to surface waters such as lakes or streams. Storm water pollution prevention plans must be in place prior to application.

All construction activities that disturb more than 5 acres (clearing, grading and excavating) are required to obtain a UPDES Construction Stormwater Permit (mainly for sediment and erosion control)

- **Ground Water Permits Needed:**
  Any facility that discharges or may discharge pollutants to ground water needs a permit. Major agricultural, municipal and industrial dischargers are regulated.

- **Underground Injection Control Permits:**
  Regulations are designed to ensure contaminants do not escape from wells into aquifers. Wells used to inject fluids associated with the production of oil and natural gas or fluids used for enhanced hydrocarbon recovery are regulated by the Division of Oil, Gas and Mining. All others are regulated by the Division of Water Quality. Most injection wells are authorized by rule and do not need individual permits but must submit notification. The Division of Water Quality sets minimum construction, operating, monitoring, reporting, financial responsibility, closure and recordkeeping requirements for all permitted injection operations.

Process
Contact the Division of Water Quality for information on permits needed and submit completed application forms. The Division issues a draft permit, seeks public comment in area newspapers, holds necessary public hearings and issues final permits.

Fees
Range from $270 to $10,800, depending upon type, size and complexity of proposed facility.

Time Required
Time needed for construction permits varies from 60 days to six months; 180 days for ground water permits and between 30 and 180 days for underground injection control permits.

Term
Most permits are valid for five years with the exception of construction permits which do not expire.

XVII) Resources

River Network: http://www.rivernetwork.org/index.cfm

State-by-State Clean Water Act: http://www.rivernetwork.org/cleanwater/cwa_search.asp

National Water Quality Control Council (NWQCC); data comparability and collaboration: http://wi.water.usgs.gov/pmethods/mdcbfs.pdf

NWQCC minimum list of metadata elements:
http://wi.water.usgs.gov/pmethods/elements/list.htm

EPA Federal and Regional Guidance on Antidegradation.
http://www.rivernetwork.org/library/index.cfm?doc_id=108

Utah's Antidegradation Policy. Collected by Prairie Rivers Network, June 2001.
http://www.rivernetwork.org/library/librivcwa_antideg_UT_Policy.PDF

Department of Environmental Quality, Division of Water Quality:
http://www.waterquality.utah.gov

Water Quality Standards:
http://www.waterquality.utah.gov. Click on "Publications and Rules," then on "HTML (onscreen)," then on "R317-2 Standards of Quality for Waters of the State."

For a copy of the *National Water Quality Inventory:2000 Report* (EPA-841-R-02-001), visit *www.epa.gov/305b/2000report/alhi.pdf* or call the EPA's National Service Center for Environmental Publications at 1-800-490-9198

Utah Division of Water Quality's 2000 Water Quality Monitoring Program::
http://www.waterquality.utah.gov/monitoring/complete_monitor_plan_2000.pdf

Utah's 2000 303(d) List of Waters, October 2000:
http://www.waterquality.utah.gov/documents/approved_2000_303d.pdf

DRAFT, Utah's 2002 303(d) List of Waters:
http://www.waterquality.utah.gov/documents/2002303dinternet.pdf

Quality Assurance and Standard Operating Procedures Manual. Utah Department of Environmental Quality, Division of WaterQuality. 1993. Utah Department of Environmental Quality, Salt Lake City, UT.

EPA National TMDL home page: This site provides an overview of the national TMDL program with links to pertinent information on state programs. It includes information on TMDL laws and regulations, policies, documents, examples of TMDLs, and more.
www.epa.gov/owow/tmdl

EPA Region 8 TMDL program: This site provides specific information on TMDL programs in EPA Region 8 (Montana, Wyoming, North Dakota, South Dakota, Colorado, and Utah). www.epa.gov/Region8/water/tmdl/index.html

Adopt Your Watershed: Learn about organizations active in your watershed! Over 4,000 watershed groups are listed. Also includes tools and resources to help new groups get started. Visit EPA's Adopt Your Watershed site at www.epa.gov/adopt/

Surf Your Watershed: This site provides multi-level water resource information. Enter your zip code and learn the facts about your watershed and ways you can get involved. Visit EPA's Surf Your Watershed site at www.epa.gov/surf

XVIII) Glossary

Acronyms

- BLM – Bureau of Land Management
- BMP – Best Management Practices
- DWQ – Division of Water Quality
- EMAP – Environmental Monitoring and Assessment Program
- EPA – Environmental Protection Agency
- GIS – Geographic Informational Systems
- NPDES – National Pollutant Discharge Elimination System
- NPS – Nonpoint Source
- RIVPACS – *a multivariate analyses used to develop metrics and biocriteria for macroinvertebrates*
- TMDL's – Total Maximum Daily Loads
- USFS – United States Forest Service
- WQB – Water Quality Board
- WQS – Water Quality Standards
- UPDES – Utah Pollutant Discharge Elimination System

Clean Water Act Words (Section 1)

Regular font definition found in state documents, italic font definitions not directly found in state documents and thus might be different.

- Benthic Macroinvertebrate – *organisms that reside the majority of their life cycle on the bottom of running water ecosystems such as rivers. Some benthic taxa are also found in wetland and lake environments. These organism are excellent indicator species, they are easy and cheap to collect and are exposed to pollutants and environment in a variety of life cycles.*
- Narrative Standards – *The suitable described condition of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control Commission. These are more difficult to enforce because they tend not to provide a clear threshold and can contain ambiguous terminology.*

- Nonpoint Source Pollutants – *contamination or potential contamination that emanates from a diffuse source, a source that cannot be narrowed to one precise point. All "non-point" sources are voluntarily regulated in comparison to point sources that are regulated under the National and State NPDES permit program.*

- Numeric Criteria – *The suitable limit (numeric level) of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control Commission.*

- Periphyton – *sessile organisms, such as algae and small crustaceans, that live attached to surfaces projecting from the bottom of a freshwater aquatic environment.*

- Phytoplankton – *minute free floating aquatic plants.*

- Point Source Pollutants – means any discernible, confined and discrete conveyance including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, concentrated animal feeding operation, or vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flow from irrigated agriculture.

- Surface Water – *Water that floats on or above the surface of the ground and may or may not be connected with water below the surface or ground water, this includes creeks, streams, rivers, conveyance structures, lakes, reservoirs, ponds and the like. All of these surface waters can be categorized into water body types for management purpose.*

- Triennial Review Process – *Federal and Colorado Clean Water Act requires that criteria, designated uses and segmentation are reviewed for each major basin in a three year rotating cycle (hence triennial review).*

- Underground Water – *are subsurface waters in a zone of saturation which are or can be brought to the surface of the ground or to surface waters through wells, springs, seeps or other discharge areas.*

XIX) Appendices

Appendices A through H are referenced the throughout the previous chapters of this document. Sources of the information and the associated websites are listed in chapter XX.

Appendix A
Designated Uses

III. Category Definitions for Listing Assessment Units.

In previous 305(b) reports and 303(d) lists, three designated use determinations were used to indicate beneficial use support: Fully Supporting, Partially Supporting and Non Supporting. For this reporting cycle, assessment units (AUs) will be placed in one of five attainment categories with sub-categories as needed (USEPA, 2004). The methodology for determining whether or not an AU is meeting water quality standards or fully supporting its designated beneficial uses is discussed in Section II. For those AUs for which there are no reliable data, either monitored or evaluated, for a specific designated beneficial use, a designation of Not Assessed for that specific beneficial use shall be assigned. For those AUs for which there are no reliable data, either monitored or evaluated, for all criteria for all applicable designated uses, a designation of **Not Assessed** will be assigned to all the designated beneficial uses for that AU.

The determination of use support using methods described in section IIand other specified protocols will be combined to determine the overall water quality standard attainment category for each AU. The unique assessment categories are described as follows (see Figure 1 also):

1. All designated uses are attained. AUs are listed in this category if there are data and information that meet all requirements of the assessment and listing methodology and support a determination of full support for all of an AU's designated beneficial uses.

2. Some of the designated uses are attained, but here is insufficient data to determine beneficial use support for the remaining designated uses. AUs are listed in this category if there are data and information that meet requirements of the assessment and listing methodology to support a determination that some, but not all, uses are attained. Attainment status of the remaining uses is unknown because there is insufficient or no data to assess beneficial use support.

3. Insufficient or no data and information to determine if any designated use is attained. AUs are listed in this category where data or information is not sufficient or does not exist to determine whether any beneficial use is attained following the requirements of the assessment and listing methodology.

4. Impaired for one or more designated uses, but does not require development of a TMDL.

A. TMDL has been completed for all pollutants. AUs are listed in this sub-category once all TMDL(s) have been developed and approved by EPA, that when implemented, are expected to result in full support of the water quality standards or support the designated beneficial uses. Where more than one pollutant is associated with the impairment of an AU, the AU remains in Category 5A for those pollutants that still need a TMDL. The completed TMDLs will be placed in Category 5B, some TMDLs completed for the AU, but some remain to be completed and approved by EPA.

B. Other pollution control requirements are reasonably expected to result in attainment of the water quality standard in the near future. Consistent with the regulation under 40 CFR, 130.7(b)(I),(ii), and (iii), AUs are listed in this subcategory where other pollution control requirements (e.g., best management practices) required by local, state, or federal authority are stringent enough to meet any water quality standard or support any beneficial use applicable to such waters.

C. The impairment is not caused by a pollutant. Assessment units are listed in this subcategory if the impairment is not caused by a pollutant (e.g., habitat alteration).

5. The water quality standard is not attained and is caused by a pollutant. The AU is found not supporting one or more of its designated beneficial uses as determined by current water quality standards and assessment methodologies. **This category constitutes the Section 303(d) list of waters.** Category 5 is further delineated into the following sub-categories.

A. A TMDL is underway or scheduled [303(d) list]. AUs are listed in this category if the AU is impaired for one or more designated uses by a pollutant. Where more than one pollutant is associated with the impairment of a single AU, the AU remains in Category 5A for the pollutant(s) for which a TMDL has not been completed and approved by EPA.

B. Some but not all TMDLs have been completed, water quality standards are now being met, new delineation of assessment unit, changes in beneficial use classification result in meeting standards, change in listing methods results in meeting beneficial uses, awaiting approval letter from EPA for UPDES permit TMDLs, or change in water quality standards: AUs are listed in this category to identify those pollutants for which a TMDL has been approved, but TMDLs are still required for other pollutants identified for the AU. If the most recent water quality assessment indicates that water quality standards are being met, the AU is listed in this sub-category also. Errors in previous assessments or a new delineation of an assessment unit is the cause for meeting water quality standards; the AU is included in this sub-category. If a change in the water quality standards was made and it results in the AU meeting the standard, the AU is listed in this category. UPDES permit renewals for which a letter of approval has not been received were placed in this category.

C. A Utah Pollutant Discharge Elimination System permit renewal TMDL is scheduled to determine discharge limitations that will meet water quality standards or protect designated beneficial uses. Parameters listed with UPDES Permit Renewal TMDLs are effluent limited and the receiving water is not impaired and does not violate water quality standards. Water quality standards may be violated and water quantity impaired if the permitted effluent limits are not met. Assessment units are listed in this category if there is a discharge permit renewal scheduled between April 1, 2004 to March 31, 2006.

D. A Lake or Reservoir has been assessed as not meeting standards for one monitoring cycle. The assessment has identified impairment during one of the even or odd year monitoring cycles. If the AU is assessed as impaired during the next assessment period, it will be listed in Category 5A, TMDL required.

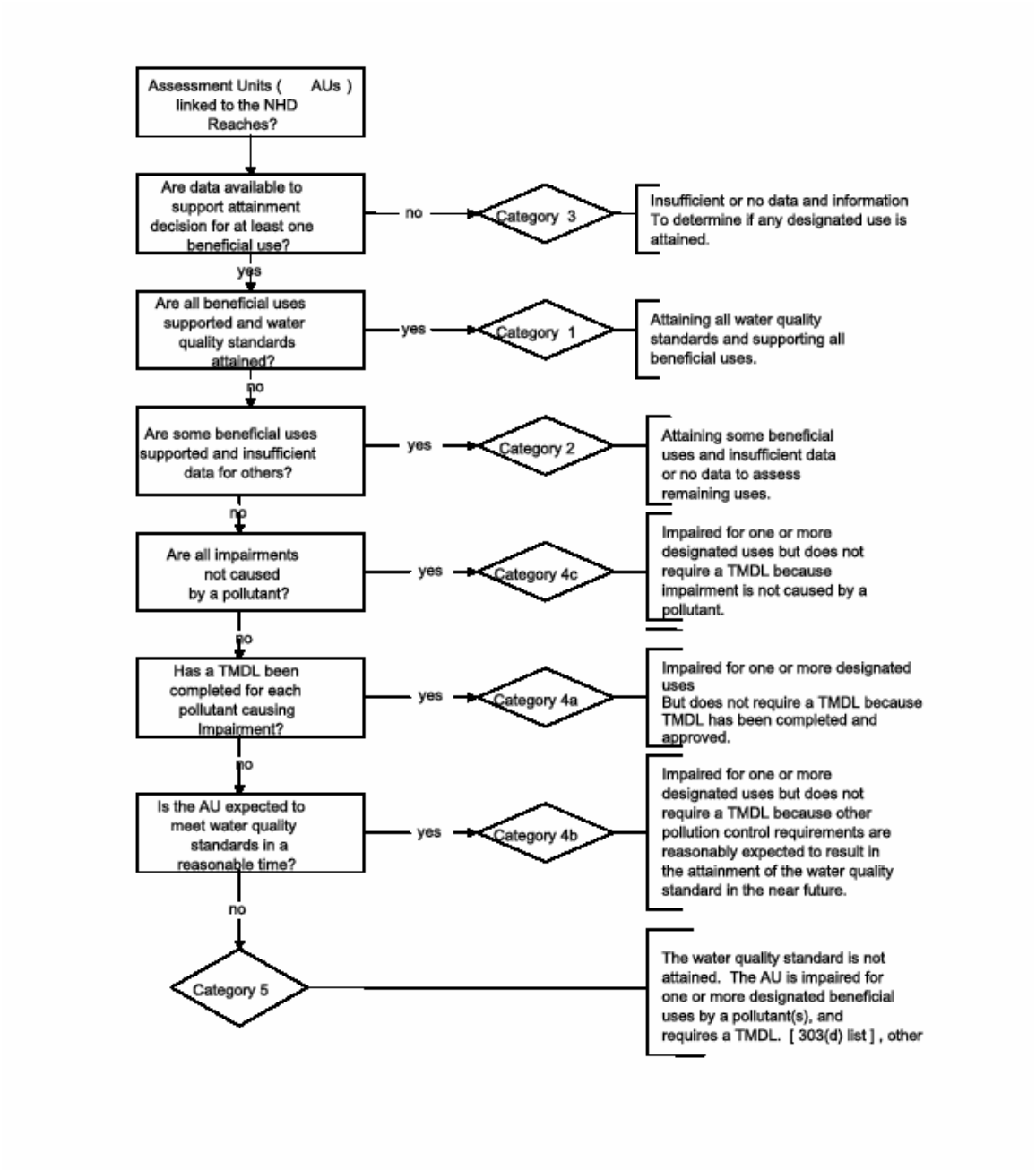

Figure 2. Decision criteria for attainment categories (USEPA, 2004). Category 5 is further divided into categories 5A [303(d) list], 5B, 5C [UPDES permit renewal TMDLs] and 5D.

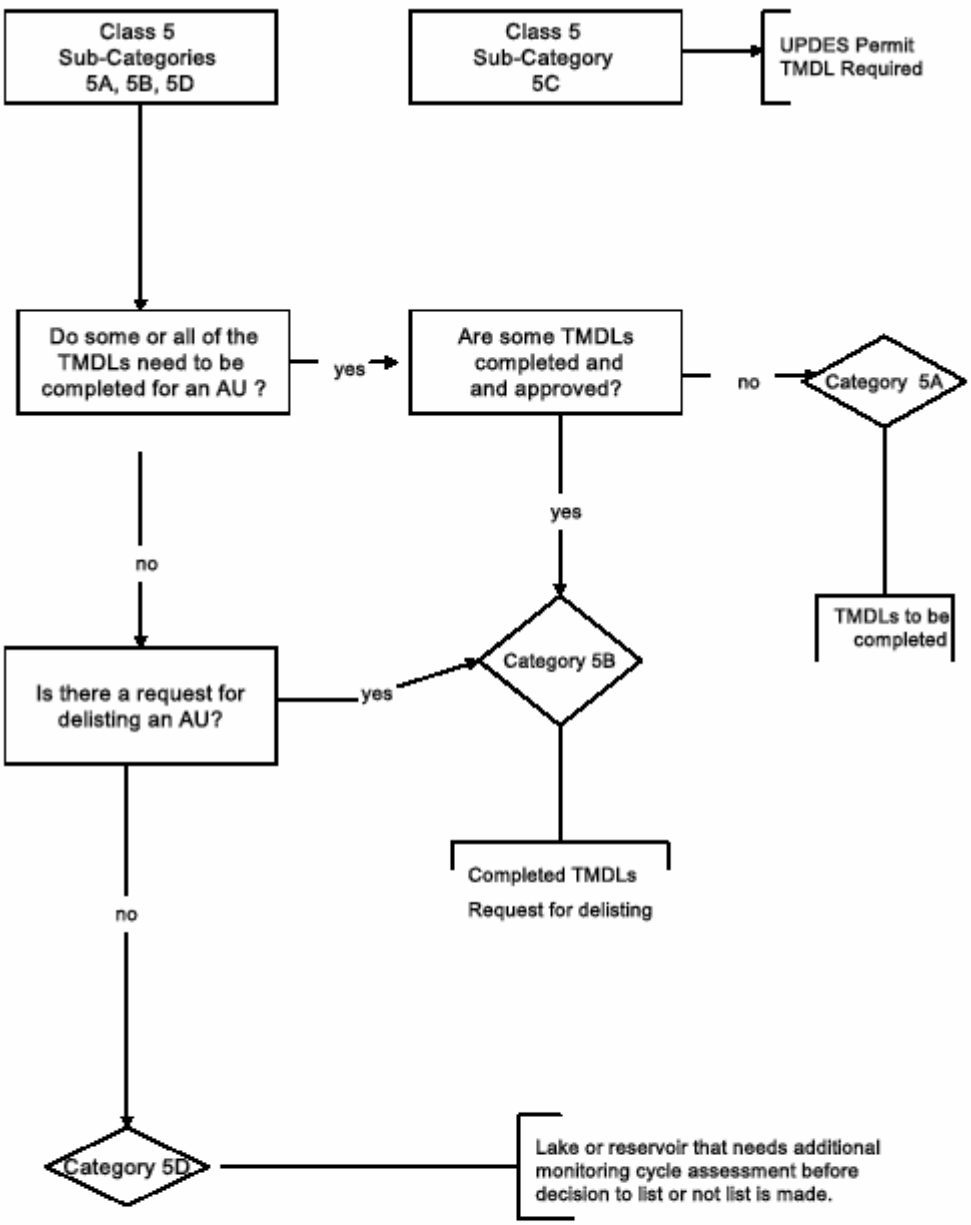

Figure 3. Flow diagram for Category 5 sub-categories .

Appendix B
Basic Standards and Treatment of Water Column

TABLE 2.14.1
NUMERIC CRITERIA FOR DOMESTIC, RECREATION, AND AGRICULTURAL USES

Parameter	Domestic Source	Recreation and Aesthetics		Agri-culture
	1C	2A	2B	4
BACTERIOLOGICAL (30-DAY GEOMETRIC MEAN) (NO.)/100 ML) (7)				
Max. Total Coliforms	5000	1000	5000	
Max. Fecal Coliforms	2000	200	200	
PHYSICAL				
pH (RANGE)	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
Turbidity Increase (NTU)		10	10	
METALS (DISSOLVED, MAXIMUM MG/L) (2)				
Arsenic	0.01		0.1	
Barium	1.0			
Cadmium	0.01			0.01
Chromium	0.05			0.10
Copper				0.2
Lead	0.05			0.1
Mercury	0.002			
Selenium	0.05		0.05	
Silver	0.05			
INORGANICS (MAXIMUM MG/L)				
Boron				0.75
Fluoride (3)	1.4-2.4			
Nitrates as N	10			
Total Dissolved Solids (4)	Irrigation			1200
	Stock Watering			2000
RADIOLOGICAL (MAXIMUM pCi/L)				
Gross Alpha	15			15
Radium 226, 228 (Combined)	5			
Strontium 90	8			
Tritium	20000			
ORGANICS (MAXIMUM UG/L)				
Chlorophenoxy Herbicides				
2,4-D	100			
2,4,5-TP	10			

Methoxychlor	100			
POLLUTION INDICATORS (5)				
Gross Beta (pCi/L)	50			50
BOD (MG/L)		5	5	5
Nitrate as N (MG/L)		4	4	
Total Phosphorus as P (MG/L)(6)		0.05	0.05	

FOOTNOTES:

(1) Reserved

(2) The dissolved metals method involves filtration of the sample in the field, acidification of the sample in the field, no digestion process in the laboratory, and analysis by atomic absorption or inductively coupled plasma (ICP) spectrophotometry.

(3) Maximum concentration varies according to the daily maximum mean air temperature.

TEMP (C)	MG/L
12.0	2.4
12.1-14.6	2.2
14.7-17.6	2.0
17.7-21.4	1.8
21.5-26.2	1.6
26.3-32.5	1.4

(4) Total dissolved solids (TDS) limits may be adjusted if such adjustment does not impair the designated beneficial use of the receiving water. The total dissolved solids (TDS) standards shall be at background where it can be shown that natural or un-alterable conditions prevent its attainment. In such cases rulemaking will be undertaken to modify the standard accordingly.

Site Specific Standards for Total Dissolved Solids (TDS)
Onion Creek: Confluence with Colorado River to road crossing above Stinking Springs, 3000 mg/l.

(5) Investigations should be conducted to develop more information where these pollution indicator levels are exceeded.

(6) Total Phosphorus as P (mg/l) indicator for lakes and reservoirs shall be 0.025.

(7) Exceedences of bacteriological numeric criteria from nonhuman nonpoint sources will generally be addressed through appropriate Federal, State, and Local nonpoint source programs.

TABLE 2.14.2
NUMERIC CRITERIA FOR AQUATIC WILDLIFE

Parameter	Aquatic Wildlife 3A	3B	3C	3D
PHYSICAL				
Total Dissolved Gases	(1)	(1)		

Minimum Dissolved Oxygen (MG/L) (2)				
30 Day Average	6.5	5.5	5.0	5.0
7 Day Average	9.5/5.0	6.0/4.0		
1 Day Average	8.0/4.0	5.0/3.0	3.0	3.0
Max. Temperature(C)(3)	20	27	27	
Max. Temperature Change (C)(3)	2	4	4	
pH (Range)	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
Turbidity Increase (NTU)	10	10	15	15
METALS (4) (DISSOLVED, UG/L)(5)				
Aluminum				
4 Day Average (6)	87	87	87	87
1 Hour Average	750	750	750	750
Arsenic (Trivalent)				
4 Day Average	150	150	150	150
1 Hour Average	340	340	340	340
Cadmium (7)				
4 Day Average	0.25	0.25	0.25	0.25
1 Hour Average	2.0	2.0	2.0	2.0
Chromium (Hexavalent)				
4 Day Average	11	11	11	11
1 Hour Average	16	16	16	16
Chromium (Trivalent) (7)				
4 Day Average	74	74	74	74
1 Hour Average	570	570	570	570
Copper (7)				
4 Day Average	9	9	9	9
1 Hour Average	13	13	13	13
Cyanide (Free)				
4 Day Average	5.2	5.2	5.2	
1 Hour Average	22	22	22	22
Iron (Maximum)	1000	1000	1000	1000
Lead (7)				
4 Day Average	2.5	2.5	2.5	2.5
1 Hour Average	65	65	65	65
Mercury				
4 Day Average	0.012	0.012	0.012	0.012
1 Hour Average	2.4	2.4	2.4	2.4
Nickel (7)				
4 Day Average	52	52	52	52
1 Hour Average	470	470	470	470
Selenium				
4 Day Average	4.6	4.6	4.6	4.6
1 Hour Average	18.4	18.4	18.4	18.4
Silver				
1 Hour Average (7)	1.6	1.6	1.6	1.6
Zinc (7)				
4 Day Average	120	120	120	120
1 Hour Average	120	120	120	120
INORGANICS (MG/L) (4)				

Total Ammonia as N (9)				
30 Day Average	(9a)	(9a)		
1 Hour Average	(9b)	(9b)	(9b)	(9b)
Chlorine (Total Residual)				
4 Day Average	0.011	0.011	0.011	
1 Hour Average	0.019	0.019	0.019	(7)
Hydrogen Sulfide (13) (Undissociated, Max. UG/L)	2.0	2.0	2.0	2.0
Phenol (Maximum)	0.01	0.01	0.01	0.01
RADIOLOGICAL (MAXIMUM pCi/L)				
Gross Alpha (10)	15	15	15	15
ORGANICS (UG/L) (4)				
Aldrin				
1 Hour Average	1.5	1.5	1.5	1.5
Chlordane				
4 Day Average	0.0043	0.0043	0.0043	0.0043
1 Hour Average	1.2	1.2	1.2	1.2
4,4' -DDT				
4 Day Average	0.0010	0.0010	0.0010	0.0010
1 Hour Average	0.55	0.55	0.55	0.55
Dieldrin				
4 Day Average	0.056	0.056	0.056	0.056
1 Hour Average	0.24	0.24	0.24	0.24
Alpha-Endosulfan				
4 Day Average	0.056	0.056	0.056	0.056
1 Hour Average	0.11	0.11	0.11	0.11
beta-Endosulfan				
4 Day Average	0.056	0.056	0.056	0.056
1 Day Average	0.11	0.11	0.11	0.11
Endrin				
4 Day Average	0.036	0.036	0.036	0.036
1 Hour Average	0.086	0.086	0.086	0.086
Heptachlor				
4 Day Average	0.0038	0.0038	0.0038	0.0038
1 Hour Average	0.26	0.26	0.26	0.26
Heptachlor epoxide				
4 Day Average	0.0038	0.0038	0.0038	0.0038
1 Hour Average	0.26	0.26	0.26	0.26
Hexachlorocyclohexane (Lindane)				
4 Day Average	0.08	0.08	0.08	0.08
1 Hour Average	1.0	1.0	1.0	1.0
Methoxychlor (Maximum)	0.03	0.03	0.03	0.03
Mirex (Maximum)	0.001	0.001	0.001	0.001
Parathion				
4 Day Average	0.013	0.013	0.013	0.013
1 Hour Average	0.066	0.066	0.066	0.066
PCB's				
4 Day Average	0.014	0.014	0.014	0.014
Pentachlorophenol (11)				
4 Day Average	15	15	15	15
1 Hour Average	19	19	19	19

Toxaphene				
4 Day Average	0.0002	0.0002	0.0002	0.0002
1 Hour Average	0.73	0.73	0.73	0.73
POLLUTION INDICATORS (11)				
Gross Beta (pCi/L)	50	50	50	50
BOD (MG/L)	5	5	5	5
Nitrate as N (MG/L)	4	4	4	
Total Phosphorus as P (MG/L) (12)		0.05	0.05	

FOOTNOTES:

(1) Not to exceed 110% of saturation.

(2) These limits are not applicable to lower water levels in deep impoundments. First number in column is for when early life stages are present, second number is for when all other life stages present.

(3) The temperature standard shall be at background where it can be shown that natural or un-alterable conditions prevent its attainment. In such cases rulemaking will be undertaken to modify the standard accordingly.

Site Specific Standards for Temperature
Ken's Lake: From June 1st - September 20th, 27 degrees C.

(4) Where criteria are listed as 4-day average and 1-hour average concentrations, these concentrations should not be exceeded more often than once every three years on the average.

(5) The dissolved metals method involves filtration of the sample in the field, acidification of the sample in the field, no digestion process in the laboratory, and analysis by atomic absorption spectrophotometry or inductively coupled plasma (ICP).

(6) The criterion for aluminum will be implemented as follows: Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaC03 in the receiving water after mixing, the 87 ug/1 chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/1 acute aluminum criterion (expressed as total recoverable).

(7) Hardness dependent criteria. 100 mg/l used. Conversion factors for ratio of total recoverable metals to dissolved metals must also be applied. In waters with hardness greater than 400 mg/l as CaC03, calculations will assume a hardness of 400 mg/l as CaC03. See Table 2.14.3 for complete equations for hardness and conversion factors.

(8) Reserved

(9) The following equations are used to calculate Ammonia criteria concentrations:

(9a) The thirty-day average concentration of total ammonia nitrogen (in mg/l as N) does not exceed, more than once every three years on the average, the chronic criterion calculated using the following equations.

Fish Early Life Stages are Present:

$$\text{mg/l as N (Chronic)} = ((0.0577/1+10^{7.688-pH}) + (2.487/1+10^{PH-7.688})) * \text{MIN}(2.85, 1.45*10^{0.028*(25-T)})$$

Fish Early Life Stages are Absent:

$$\text{mg/1 as N (Chronic)} = ((0.0577/1+10^{7.688-pH}) + (2.487/1+10^{pH-7.688}))$$

$* 1.45*10^{0.028* (25-MAX(T-7))})$

(9b) The one-hour average concentration of total ammonia nitrogen (in mg/l as N) does not exceed, more than once every three years on the average the acute criterion calculated using the following equations.

Class 3A:

$$mg/l \text{ as } N \text{ (Acute)} = (0.275/(1+10^{7.204-pH})) + (39.0/1+10^{pH7.204}))$$

Class 3B, 3C, 3D:

$$mg/l \text{ as } N \text{ (Acute)} = 0.411/(1+10^{7.204-pH})) + (58.4/(1+10^{pH-7.204}))$$

In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the chronic criterion. The "Fish Early Life Stages are Present" 30-day average total ammonia criterion will be applied by default unless it is determined by the Division, on a site-specific basis, that it is appropriate to apply the "Fish Early Life Stages are Absent" 30-day average criterion for all or some portion of the year. At a minimum, the "Fish Early Life Stages are Present" criterion will apply from the beginning of spawning through the end of the early life stages. Early life stages include the pre-hatch embryonic stage, the post-hatch free embryo or yolk-sac fry stage, and the larval stage for the species of fish expected to occur at the site. The division will consult with the Division of Wildlife Resources in making such determinations. The Division will maintain information regarding the waterbodies and time periods where application of the "Early Life Stages are Absent" criterion is determined to be appropriate.

(10) Investigation should be conducted to develop more information where these levels are exceeded.

(11) pH dependent criteria. pH 7.8 used in table. See Table 2.14.4 for equation.

(12) Total Phosphorus as P (mg/l) indicator for lakes and reservoirs shall be 0.025.

(13) Formula to convert dissolved sulfide to un-disassociated hydrogen sulfide is: $H_2S = \text{Dissolved Sulfide} * e^{((1.92 + pH) + 12.85)}$

TABLE

1-HOUR AVERAGE (ACUTE) CONCENTRATION OF TOTAL AMMONIA AS N (MG/L)

pH	Class 3A	Class 3B, 3C, 3D
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.8
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40

8.1	4.64	6.95
8.2	3.83	5.72
8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.89	1.32

TABLE
30-DAY AVERAGE (CHRONIC) CONCENTRATION OF TOTAL AMMONIA AS N (MG/l)

Fish Early Life Stages Present
Temperature, C

pH	0	14	16	18	20	22	24	26	28	30
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.90
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.88	0.77
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.97	0.86	0.75	0.66
8.3	1.52	1.52	1.39	1.22	1.07	0.94	0.83	0.73	0.64	0.56
8.4	1.29	1.29	1.17	1.03	0.91	0.80	0.70	0.62	0.54	0.48
8.5	1.09	1.09	0.99	0.87	0.76	0.67	0.59	0.52	0.46	0.40
8.6	0.92	0.92	0.84	0.73	0.65	0.57	0.50	0.44	0.39	0.34
8.7	0.78	0.78	0.71	0.62	0.55	0.48	0.42	0.37	0.33	0.29
8.8	0.66	0.66	0.60	0.53	0.46	0.41	0.36	0.32	0.28	0.24
8.9	0.56	0.56	0.51	0.45	0.40	0.35	0.31	0.27	0.24	0.21
9.0	0.49	0.49	0.44	0.39	0.34	0.30	0.26	0.23	0.20	0.18

TABLE
30-DAY AVERAGE (CHRONIC) CONCENTRATION OF TOTAL AMMONIA AS N (MG/l)

Fish Early Life Stages Absent
Temperature, C

pH	0-7	8	9	10	11	12	13	14	16
6.5	10.8	10.1	9.51	8.92	8.36	7.84	7.36	6.89	6.06
6.6	10.7	10.1	9.37	9.37	8.79	8.24	7.72	7.24	6.36
6.7	10.5	9.99	9.20	8.62	8.08	7.58	7.11	6.66	5.86
6.8	10.2	9.81	8.98	8.42	7.90	7.40	6.94	6.51	5.72
6.9	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33	5.56
7.0	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11	5.37
7.1	9.20	8.63	8.09	7.58	7.11	6.67	6.25	5.86	5.15

7.2	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57	4.90
7.3	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25	4.61
7.4	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89	4.30
7.5	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51	3.97
7.6	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11	3.61
7.7	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70	3.25
7.8	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29	2.89
7.9	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89	2.54
8.0	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52	2.21
8.1	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17	1.91
8.2	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85	1.63
8.3	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58	1.39
8.4	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33	1.17
8.5	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13	0.990
8.6	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951	0.836
8.7	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805	0.707
8.8	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684	0.601
8.9	0.917	0.860	0.806	0.758	0.709	0.664	0.623	0.584	0.513
9.0	0.790	0.740	.694	0.651	0.610	0.572	0.536	0.503	0.442

pH	18	20	22	24	26	28	30
6.5	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	4.41	3.78	3.33	2.92	2.57	2.26	1.99
7.3	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	0.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	0.68	1.47	1.29	1.14	1.00	0.879	0.733
8.2	0.43	1.26	1.11	0.073	0.855	0.752	0.661
8.3	0.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	0.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.735	0.646	0.568	0.499	0.439	0.396	0.339
8.7	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.389	0.342	0.300	0.264	0.232	0.204	0.179

TABLE 2.14.3a

EQUATIONS TO CONVERT TOTAL RECOVERABLE METALS WITH HARDNESS DEPENDENCE TO DISSOLVED METALS BY APPLICATION OF A CONVERSION FACTOR (CF).

Parameter	4-Day Average (Chronic) Concentration (UG/L)
CADMIUM	$CF * e^{(1.0166(\ln(hardness)) -3.924}$

CF = 1.136672 - (In hardness) (0.041838)

CHROMIUM III

CF * $^{(0.8190(In(hardness)) + 0.6848}$ CF = 0.860

COPPER CF * $e^{(0.8545(ln(hardness)) -1.702)}$
CF = 0.960

LEAD CF * $e^{(1.273(ln(hardness))-4.705)}$
CF = 1.46203 - (ln hardness)(0.145712)

NICKEL CF * $e^{(0.8460(ln(hardness))+0.0584)}$
CF = 0.997

SILVER N/A

ZINC Cf * $e^{(0.8473(ln(hardness))+0.884)}$ CF = 0.986

TABLE 2.14.3b

EQUATIONS TO CONVERT TOTAL RECOVERABLE METALS WITH HARDNESS DEPENDENCE TO DISSOLVED METALS BY APPLICATION OF A CONVERSION FACTOR (CF).

Parameter 1-Hour Average (Acute)
Concentration (UG/L)

CADMIUM CF * $e^{(1.0166(In(hardness))-3.924)}$
CF = 1.136672 - (ln hardness)(0.041838)

CHROMIUM (III) CF * $e^{(0.8190(ln(hardness)) +3.7256)}$
CF = 0.316

COPPER CF * $e^{(0.9422(ln(hardness))- 1.700)}$
CF = 0.960

LEAD CF * $e^{(1.273(ln(hardness))-1.460)}$
CF = 1.46203 - (ln hardness)(0.145712)

NICKEL CF * $e^{(0.8460(ln(hardness)) +2.255}$
CF= 0.998

SILVER CF * $e^{(1.72(ln(hardness))- 6.59}$
CF = 0.85

ZINC CF * $e^{(0.8473(ln(hardness)) +0.884}$
CF = 0.978

FOOTNOTE:
(1) Hardness as mg/l $CaCO_3$.

TABLE 2.14.4
EQUATIONS FOR PENTACHLOROPHENOL(pH DEPENDENT)

4-Day Average (Chronic) Concentration (UG/L)	1-Hour Average (Acute) Concentration (UG/L)
$e^{(1.005(pH))-5.134}$	$e^{(1.005(pH))-4.869}$

TABLE 2.14.5
SITE SPECIFIC CRITERIA FOR DISSOLVED OXYGEN FOR JORDAN RIVER AND SURPLUS CANAL SEGMENTS(SEE SECTION 2.13)

DISSOLVED OXYGEN:

May-July	
7-day average	5.5 mg/l
30-day average	5.5 mg/l
Instantaneous minimum	4.5 mg/l
August-April	
30-day average	5.5 mg/l
Instantaneous minimum	4.0 mg/l

TABLE 2.14.6
LIST OF HUMAN HEALTH CRITERIA (CONSUMPTION)

Chemical Parameter	Water and Organism (ug/L) Class 1C	Organism Only (ug/L) Class 3A,3B,3C,3D
Antimony	5.6	640
Arsenic	A	A
Beryllium	C	C
Cadmium	C	C
Chromium III	C	C
Chromium VI	C	C
Copper	1,300	
Lead	C	C
Mercury	A	A
Nickel	610	4,600
Selenium	A	4,200
Silver		
Thallium	1.7	6.3
Zinc	7,400	26,000
Cyanide	700	220,000
Asbestos	7 million Fibers/L	
2,3,7,8-TCDD Dioxin	5.0 E -9 B	5.1 E-9 B
Acrolein	190	290
Acrylonitrile	0.051 B	0.25 B
Benzene	2.2 B	51 B
Bromoform	4.3 B	140 B
Carbon Tetrachloride	0.23 B	1.6 B
Chlorobenzene	680	21,000
Chlorodibromomethane	0.40 B	13 B
Chloroethane		
2-Chloroethylvinyl Ether		
Chloroform	5.7 B	470 B
Dichlorobromomethane	0.55 B	17 B
1,1-Dichloroethane		
1,2-Dichloroethane	0.38 B	37 B
1,1-Dichloroethylene	0.057 B	3.2 B
1,2-Dichloropropane	0.50 B	15 B
1,3-Dichloropropene	10	1,700
Ethylbenzene	3,100	29,000

Methyl Bromide	47		1,500
Methyl Chloride	F		F
Methylene Chloride	4.6 B		590 B
1,1,2,2-Tetrachloroethane	0.17 B		4.0 B
Tetrachloroethylene	0.69 B		3.3 B
Toluene	6,800		200,000
1,2 -Trans-Dichloroethylene	700		140,000
1,1,1-Trichloroethane	F		F
1,1,2-Trichloroethane	0.59 B		16 B
Trichloroethylene	2.5 B		30 B
Vinyl Chloride	2.0 B		530 B
2-Chlorophenol	81		150
2,4-Dichlorophenol	77		290
2,4-Dimethylphenol	380		850
2-Methyl-4,6-Dinitrophenol	13.0		280
2,4-Dinitrophenol	69		5,300
2-Nitrophenol			
4-Nitrophenol			
3-Methyl-4-Chlorophenol			
Penetachlorophenol	0.27 B		3.0 B
Phenol	21,000		1,700,000
2,4,6-Trichlorophenol	1.4 B		2.4 B
Acenaphthene	670		990
Acenaphthylene			
Anthracene	8,300		40,000
Benzidine	0.000086 B		0.00020 B
BenzoaAnthracene	0.0038 B		0.018 B
BenzoaPyrene	0.0038 B		0.018 B
BenzobFluoranthene	0.0038 B		0.018 B
BenzoghiPerylene			
BenzokFluoranthene	0.0038 B		0.018 B
Bis2-ChloroethoxyMethane			
Bis2-ChloroethylEther	0.030 B		0.53 B
Bis2-Chloroisopropy1Ether	1,400		65,000
Bis2-EthylbexylPhthalate	1.2 B		2.2 B
4-Bromophenyl Phenyl Ether			
Butylbenzyl Phthalate	1,500		1,900
2-Chloronaphthalene	1,000		1,600
4-Chlorophenyl Phenyl Ether			
Chrysene	0.0038 B		0.018 B
Dibenzoa, hAnthracene	0.0038 B		0.018 B
1,2-Dichlorobenzene	2,700		17,000
1,3-Dichlorobenzene	320		960
1,4-Dichlorobenzene	400		2,600
3,3-Dichlorobenzidine	0.021 B		0.028 B
Diethyl Phthalate	17,000		44,000
Dimethyl Phthalate	270,000		1,100,000
Di-n-Butyl Phthalate	2,000		4,500
2,4-Dinitrotoluene	0.11 B		3.4 B
2,6-Dinitrotoluene			
Di-n-Octyl Phthalate			
1,2-Diphenylhydrazine	0.036 B		0.20 B
Fluoranthene	130	140	
Fluorene	1,100		5,300
Hexachlorobenzene	0.00028 B		0.00029 B
Hexachlorobutedine	0.44 B		18 B
Hexachloroethane	1.4 B		3.3 B

Hexachlorocyclopentadiene	240	17,000
Ideno 1,2,3-cdPyrene	0.0038 B	0.018 B
Isophorone	35 B	960 B
Naphthalene		
Nitrobenzene	17	690
N-Nitrosodimethylamine	0.00069 B	3.0 B
N-Nitrosodi-n-Propylamine	0.005 B	0.51 B
N-Nitrosodiphenylamine	3.3 B	6.0 B
Phenanthrene		
Pyrene	830	4,000
1,2,4-Trichlorobenzene	260	940
Aldrin	0.000049 B	0.000050 B
alpha-BHC	0.0026 B	0.0049 B
beta-BHC	0.0091 B	0.017 B
gamma-BHC (Lindane)	0.019 B	0.063 B
delta-BHC		
Chlordane	0.00080 B	0.00081 B
4,4-DDT	0.00022 B	0.00022 B
4,4-DDE	0.00022 B	0.00022 B
4,4-DDD	0.00031 B	0.00031 B
Dieldrin	0.000052 B	0.000054 B
alpha-Endosulfan	62	89
beta-Endosulfan	62	89
Endosulfan Sulfate	62	89
Endrin	0.76	0.81
Endrin Aldehyde	0.29	0.30
Heptachlor	0.000079 B	0.000079 B
Heptachlor Epoxide	0.000039 B	0.000039 B
Polychlorinated Biphenyls PCB's	0.000064 B,D	0.000064 B,D
Toxaphene	0.00028 B	0.00028 B

Footnotes:

A. See Table 2.14.2

B. Based on carcinogenicity of 10-6 risk.

C. EPA has not calculated a human criterion for this contaminant. However, permit authorities should address this contaminant in NPDES permit actions using the State's existing narrative criteria for toxics

D. This standard applies to total PCBs.

Appendix C
Stream and Waterbody Segmentation / Classification

13.1 Upper Colorado River Basin

a. Colorado River Drainage

			TABLE	
Paria River and tributaries, from state line to headwaters		2B	3C	4
All tributaries to Lake Powell, except as listed below		2B	3B	4
Escalante River and tributaries, from Lake Powell to confluence with Boulder Creek		2B	3C	4
Escalante River and tributaries, from confluence with Boulder Creek, including Boulder Creek, to headwaters		2B 3A		4
Dirty Devil River and tributaries, from Lake Posell to Fremont River		2B	3C	4
Deer Creek and tributaries, from confluence with Boulder Creek to headwaters		2B 3A		4
Fremont River and tributaries, from confluence with Muddy Creek to Capitol Reef National Park, except as listed below	1C	2B	3C	4
Pleasant Creek and tributaries, from confluence with Fremont Rive to East boundary of Capitol Reef National Park		2B	3C	4
Pleasant Creek and tributaries, from East boundary of Capitol Reef National Park to headwaters	1C	2B 3A		
Fremont River and tributaries, through Capitol Reef National Park to headwaters	1C	2B 3A		4
Muddy Creek and tributaries, from confluence with Fremont River to Highway U-10 crossing, except as listed below		2B	3C	4
Quitchupah Creek and Tributaries, from Highway U-10 crossing to headwaters		2B 3A		4
Ivie Creek and tributaries, from Highway U-10 to headwaters		2B 3A		4
Muddy Creek and tributaries, from Highway U-10 crossing to headwaters	1C	2B 3A		4
San Juan River and				

Tributaries, from Lake Powell to state line except As listed below:	1C	2B	3B		4
Johnson Creek and tributaries, from confluence with Recapture Creek to headwaters	1C	2B	3A		4
Verdure Creek and tributaries, from Highway US-191 crossing to headwaters		2B	3A		4
North Creek and tributaries, from confluence with Montezuma Creek to headwaters	1C	2B	3A		4
South Creek and tributaries, from confluence with Montezuma Creek to headwaters	1C	2B	3A		4
Spring Creek and tributaries, from confluence with Vega Creek to headwaters		2B	3A		4
Montezuma Creek and tributaries, from U.S. Highway 191 to headwaters	1C	2B	3A		4
Colorado River and tributaries, from Lake Powell to state line except as listed below	1C	2B	3B		4
Indian Creek and tributaries, through Newspaper Rock State Park to headwaters	1C	2B	3A		4
Kane Canyon Creek and tributaries, from confluence with Colorado River to headwaters		2B		3C	4
Mill Creek and tributaries, from confluence with Colorado River to headwaters	1C	2B	3A		4
Dolores River and tributaries, from confluence with Colorado River to state line		2B		3C	4
Roc Creek and tributaries, from confluence with Dolores River to headwaters		2B	3A		4
LaSal Creek and tributaries, from state line to headwaters		2B	3A		4
Lion Canyon Creek and tributaries, from state line to headwaters		2B	3A		4
Little Dolores River and tributaries, from confluence with Colorado River to state line		2B	3C		4
Bitter Creek and tributaries, from confluence with Colorado River to headwaters		2B	3C		4

Appendix D
Treatment of Sediment
(not available)

Appendix E
Treatment of Biological

UTAH

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Program Description

Prior to 2001, The Utah Division of Water Quality (DWQ) Biological Assessment program was limited to benthic macroinvertebrate data collected at 18 long-term monitoring sites. They have been sampled since 1978 with the exception of about five years in which the allocation of the 18 samples were used to supplement water chemistry and physical data collected in the five-year basin rotation monitoring plan. These samples were collected to ascertain long-term water quality and to be used in determining trends. In addition, benthic macroinvertebrate samples were collected at 16 Nonpoint Source Project sites to assess the effects of BMP implementation. These data have been incorporated into several NPS reports to determine what improvements in water quality have occurred. Data collected from the 18 long-term monitoring sites and the NPS projects have been used in making beneficial use assessments (305(b)) and listing waters on the 303(d) list.

In 2001, the DWQ reviewed its bio-monitoring program and decided that a major effort was needed to improve and develop new components of its water quality assessment program. During this review, an inventory of benthic macroinvertebrate data collected by DWQ, the U.S. Bureau of Land Management (BLM), and the U.S. Forest Service (USFS) was completed. Upon completion of this review, the DWQ contacted the BLM and USFS and requested all of the benthic macroinvertebrate data that they had collected from 1990 through 1997 be sent to DWQ for entering into STORED. These data, along with DWQ's, were entered into STORET. Data collected since 1997 have been stored electronically and a program to electronically transfer these data into STORET is being developed. These data will be evaluated as to their usefulness in establishing reference sites and the development of metrics to be used in assessing beneficial use support.

In 2001, the DWQ negotiated an agreement to complete the E-MAP sampling for EPA within the State. Experience obtained from this work would allow environmental scientists (field and staff) to learn and evaluate the methods used in the E-MAP protocol. This experience could then be used to develop a bioassessment protocol for assessing waters within the State.

Concurrent with doing the E-MAP work, the Division decided to commit additional resources to develop reference sites for bioassessment work. It was decided that the DWQ would select and try to sample up to 60 potential reference sites during the next 2-3 years. Water chemistry, fish, benthic macroinvertebrate, periphyton, and physical habitat data will be collected at these sites. The selection of sites were based upon the different ecoregions within the state and the need for low elevation, low-gradient stream reference sites.

DWQ is also assisting the EPA Corvallis Lab in reviewing and selecting reference sites that were initially selected using GIS techniques. Approximately 100 sites were initially selected and the number has been reduced to 20 sites. The DWQ is assisting in sampling these sites. Information obtained from this program will be evaluated and possibly incorporated into the Division's bio-assessment program.

The DWQ has committed to developing a set of reference sites and metrics that can be used to ensure that the waters of the State are assessed in a scientifically sound and standard method. Work is also going on to evaluate other assessment methods such as RIVPACS in assessing beneficial use support.

Documentation and Further Information

Utah Water Quality Assessment Report to Congress, September 2000 and Year 2000 Water Quality Inventory, 305(b) Assessment: http://www.waterquality.utah.gov/2000_305b_fact.pdf

Utah Division of Water Quality's 2000 Water Quality Monitoring Program:: http://www.waterquality.utah.gov/monitoring/complete_monitor_plan_2000.pdf

Utah's 2000 303(d) List of Waters, October 2000: http://www.waterquality.utah.gov/documents/approved_2000_303d.pdf

DRAFT, Utah's 2002 303(d) List of Waters: http://www.waterquality.utah.gov/documents/2002303dinternet.pdf

Quality Assurance and Standard Operating Procedures Manual. Utah Department of Environmental Quality, Division of Water Quality. 1993. Utah Department of Environmental Quality, Salt Lake City, UT.

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UTAH

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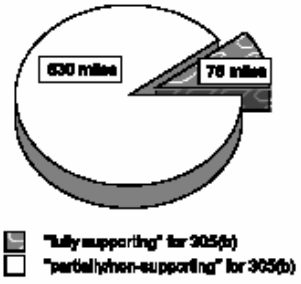
Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
		promulgated into state water quality standards as biocriteria
		support of antidegradation
		evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
		other:
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(special projects, specific river basins or watersheds and comprehensive use throughout jurisdiction)*
	✓	fixed station (i.e., water quality monitoring stations) *(special projects, specific river basins or watersheds and comprehensive use throughout jurisdiction)*
		probabilistic by stream order/catchment area
		probabilistic by ecoregion, or statewide
	✓	rotating basin *(specific river basins or watersheds and comprehensive use throughout jurisdiction)*
		other:

Stream Miles

Total miles *(determined using the National Hydrography database and state based determination)*	**85,916**
Total perennial miles	14,000+
Total miles assessed for biology*	**705**
fully supporting for 305(b)	75
partially/non-supporting for 305(b)	630
listed for 303(d)	300
number of sites sampled *(on an annual basis)*	~56
number of miles assessed per site	12.6

705 Miles Assessed for Biology



*Biological data were used along with water chemistry data to assess the above listed miles. The biological assessment was done using benthic macroinvertebrates and used a weight-of-evidence assessment because reference sites were not used. Diversity indices, the Biotic Condition Index, and the number of sediment and nutrient tolerant taxa were used to determine beneficial use support when the pollution indicator value for total phosphorus was exceeded.

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Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Class System (A,B,C)	
ALU designations in state water quality standards	Five designations*	
Narrative Biocriteria in WQS	none - Procedures used to support general aquatic life statement in WQS are not standardized, but are primarily based on best professional judgment using some metrics.	
Numeric Biocriteria in WQS	none	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
		cause and effect determinations
		permitted discharges
	✓	monitoring (e.g., improvements after mitigation)
	✓	watershed based management
Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	Used primarily in assessing 319 nonpoint source projects including assessment, implementation of BMPs, and evaluation of water quality	

*The designations are as follows: 3A - cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food web. 3B - warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food web. 3C - Nongame fish and other aquatic life including the necessary aquatic organisms in their food chain. 3D - Waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain. 3E - Severely habitat-limited waters.

Reference Site/Condition Development**

Number of reference sites	**not applicable**	
Reference site determinations		site-specific
		paired watersheds
		regional (aggregate of sites)
		professional judgment
		other:
Reference site criteria		
Characterization of reference sites within a regional context		historical conditions
		least disturbed sites
		gradient response
		professional judgment
		other:
Stream stratification within regional reference conditions		ecoregions (or some aggregate)
		elevation
		stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
		other:
Additional information		reference sites linked to ALU
		reference sites/condition referenced in water quality standards
		some reference sites represent acceptable human-induced conditions

**Utah is currently working with the EMAP to develop reference sites.

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Field and Lab Methods

Assemblages assessed	✓	benthos *(<100 samples/year; multiple seasons, multiple sites – broad coverage for watershed level)*
		fish
	UD	periphyton *(A periphyton program is under development and will be used primarily in nutrient-impacted streams. Dr. Sam Rushforth, at Utah Valley State College, is assisting in the development of this program.)*
		other:
Benthos		
sampling gear	rock baskets and Hess; 200-400 micron mesh	
habitat selection	riffle/run (cobble) and artificial substrate	
subsample size	300 count	
taxonomy	combination	
Habitat assessments	quantitative measurements, and a few nonpoint source project sites have pebble counts, channel profiles and riparian condition evaluated on a very limited basis; performed with bioassessments	
Quality assurance program elements	standard operating procedures and quality assurance plan	

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
		parametric ANOVAs
		multivariate analysis
	✓	biological metrics *(return single metrics - use endpoint for each single metric)*
		disturbance gradients
	✓	other: some tolerance information is used in the evaluation
Multimetric thresholds*		
transforming metrics into unitless scores	BCI Methods described by USFS are used to differentiate higher quality waters, less discriminating in impaired waters.	
Evaluation of performance* characteristics		repeat sampling
		precision
Not currently evaluated		sensitivity
		bias
		accuracy
Biological data**		
Storage	Data are currently being loaded into STORET	
Retrieval and analysis	SAS (metrics are calculated by the contracting laboratory using spreadsheets or another computer program–language not known)	

*EPA is currently having a contractor review benthic macroinvertebrate data to determine what metrics might apply to various regions of the State. Any metrics presently being used are those produced by the contracting laboratory and best professional judgement is used in the interpretation. No metric sensitivity analyses, regional biases, or other evaluations have been done to this point.

**EPA's Assessment Database is being used to store and retrieve assessment information for Utah's 305(b) report. Some indexing of waterbodies still needs to be done, but this should be completed during fiscal year 2002.

Appendix F
Naming Conventions

II. ASSESSMENT UNIT DELINEATION AND IDENTIFICATION.

To assess waters of the State, the Division of Water Quality (DWQ) has delineated lakes, reservoirs, streams, and rivers into discrete units called assessment units (AUs). Lakes and reservoirs have been delineated as individual AUs and the size is reported in acres. Rivers and streams have been delineated by specific river, river or stream reach, or several stream reaches in sub-watersheds. When using sub-watersheds to delineate stream AUs, the new U.S.G.S. 5th (10 digit) and 6th (12 digit) level watershed units for Utah were used to delineate the AUs. These watershed units allow for the aggregation of stream reaches into individual AUs that are hydrologically defined. The watershed units were developed by a group of individuals representing state and federal agencies, and have been certified by the Natural Resource Conservation Service. In delineating river and stream AUs, DWQ followed the guidelines listed below with the first two guideline statements being fixed rules.

1. Each AU is within an eight-digit USGS hydrologic unit (HUC).

2. Each river and stream AU was comprised of stream reaches having the same water quality standards classifications (2B, 1C, 3A, and 4 or 2B, 3B, and 4).

3. Large rivers such as the Green River, Colorado River and portions of other large rivers (Bear River, Weber River, etc), were delineated into "linear" or "ribbon" AUs. Where a major tributary entered these rivers or hydrological features such as dams exist, the river was further delineated into two or more AUs.

4. Tributary rivers and streams were delineated primarily using the 5th and 6th level hydrologic units to define the AUs.

5. Additional AUs were defined by combining or splitting 5th or 6th level watersheds using tributary streams, stream size, and ecological changes such as geology, vegetation, or land use.

6. Small tributary streams to larger streams that could not be incorporated into a watershed unit were combined into separate unique AUs.

These AUs units have been geo-referenced (indexed) to the National Hydrologic Database using a reach-indexing tool that provides the capability of using GIS techniques to display information and data for each AU. Beneficial use classifications and assessments for individual AUs can be mapped or displayed to provide visual representation of assessment results. Individual stream AUs were assigned a unique identification code for indexing which includes the 8-digit hydrological unit (HUC) number with the prefix UT and a 3-digit code to identify each unique AU in a HUC. Lake and reservoir AUs were identified by adding the prefix UT-L- to the 8-digit HUC number and adding a 3-digit code.

Figure 1 illustrates the results of using the above guidelines to delineate and identify AUs. The Weber River was delineated as a linear AU from its confluence with Chalk Creek upstream to the Wanship Dam (UT16020101-017). One AU, UT16020101-011, in the Chalk Creek watershed was delineated by combining two 5th level watershed units located in the South Fork Chalk Creek sub-basin. The first AU (UT16020101-010) in the Chalk Creek watershed was delineated using the confluence of the South Fork as the upstream point. This necessitated splitting the 5th level watershed unit into two segments. An example of small tributary streams that could not be combined into a hydrological based AU is illustrated by the AU, UT16020101-019. These are very small tributaries and the Weber River is not reflective of their stream order or the habitat that they flow through. Rockport Reservoir (UT-L-16020101-002) and Echo Reservoir (UT16020101-001) are examples of lake and reservoir AUs.

Appendix G
303(d) example

Table 8. Category 5A: River and Stream Assessment Units Requiring a TMDL									
									Targeted
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	TMDL Priority	For TMDL 2004-2006
Bear	UT16010101-006	Bear River-4	Bear River from Woodruff Creek to Utah-Wyoming border	3A	54.79	PS	Dissolved Oxygen	High	Yes
Bear	UT16010101-009	Bear River-5	Bear River from Utah-Wyoming border to Woodruff Creek confluence	3A	11.84	PS	Dissolved Oxygen		
Bear	UT16010101-016	Saleratus Creek	Saleratus Creek and tributaries from confluence with Woodruff Creek to headwaters	3A	23.37	PS	Dissolved Oxygen	High	Yes
Colorado River Southeast	UT14010005-001	Colorado River-6	Colorado River from HUC 14010005/14030001 boundary to Colorado State Line	3B	3.84	NS	Selenium	Low	Sources Outside of State Borders
Colorado River Southeast	UT14030001-005	Colorado River-5	Colorado River from Dolores River confluence to HUC 14010005 boundary	3B	33.79	NS	Selenium	Low	Sources Outside of State Borders
Colorado River Southeast	UT14030005-009	Castle Creek	Castle Creek and tributaries from confluence with Colorado River to headwaters	4	18.20	PS	Salinity/TDS/chlorides		
Colorado River West	UT14060007-007	Price River-3	Price River and tributaries from Coal Creek confluence to Carbon Canal Diversion	4	16.65	PS	Salinity/TDS/chlorides		
Colorado River West	UT14060007-014	Price River-4	Price River and tributaries from near Woodside to Soldier Creek confluence	4	67.83	NS	Salinity/TDS/chlorides		
Colorado River West	UT14060007-015	Price River-5	Price River and tributaries from confluence w/Green River to near Woodside	4	24.50	NS	Salinity/TDS/chlorides		
Colorado River West	UT14060009-004	Huntington Creek-2	Huntington Creek and tributaries from Highway 10 crossing to USFS boundary	4	19.24	NS	Salinity/TDS/chlorides		
Colorado River West	UT14060009-010	Huntington Creek-1	Huntington Creek from confluence with San Rafael River to Highway 10	4	25.79	NS	Salinity/TDS/chlorides		
Colorado River West	UT14060009-011	Lower Cottonwood Creek	Cottonwood Creek from confluence w/Huntington Creek to Highway 57	4	17.77	NS	Salinity/TDS/chlorides		
Colorado River West	UT14060009-013	Upper San Rafael	San Rafael River from Buckhorn Crossing to confluence Huntington and Cottonwood Creeks	4	23.25	NS	Salinity/TDS/chlorides		
Colorado River West	UT14060009-014	Lower San Rafael	San Rafael from confluence w/ Green River to Buckhorn Crossing	4	82.76	NS	Salinity/TDS/chlorides		

Table 8. Category 5A: River and Stream Assessment Units Requiring a TMDL									
									Targeted
Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant	TMDL Priority	For TMDL 2004-2006
Colorado River West	UT14070002-006	Middle Muddy	Muddy Creek and tributaries from Quitchipah Creek confluence to U-10 xing	4	20.07	NS	Salinity/TDS/chlorides		
Colorado River West	UT14070002-007	Lower Quitchipah Creek	Quitchipah Creek from confluence of Ivie Cr. to U-10 xing	4	9.95	NS	Salinity/TDS/chlorides		
Colorado River West	UT14070002-008	Lower Ivie Creek	Ivie Creek and tributaries from confluence w/Muddy River to U-10 highway	4	14.01	NS	Salinity/TDS/chlorides		
Colorado River West	UT14070002-009	Lower Muddy Creek	Muddy Creek from confluence w/Freemont River to Ivie Creek confluence	4	84.79	NS	Salinity/TDS/chlorides		
Colorado River West	UT14070002-009	Lower Muddy Creek	Muddy Creek from confluence w/Freemont River to Ivie Creek confluence	3C	84.79	PS	Selenium		
Colorado River West	UT14070005-012	Upper Escalante	Escalante River and some tributaries from Boulder Creek confluence to Birch Creek confluence	3A	26.78	PS	Temperature	High	Yes
Colorado River West	UT14070007-001	Paria River-1	Paria River from start of Paria River Gorge to headwaters	4	16.77	NS	Salinity/TDS/chlorides	High	Yes
Colorado River West	UT14070007-005	Paria River-3	Paria River and tributaries from Arizona-Utah Stateline to Cottonwood Creek confluence	4	9.23	NS	Salinity/TDS/chlorides	High	Yes
Jordan	UT16020201-001	American Fork River-1	American Fork River and tributaries from Diversion at mouth of Canyon to Tibble Fork Reservoir	2B,3A,4	14.15	PS	pH		
Jordan	UT16020201-003	Currant Creek	Current Creek from mouth of Goshen Canyon to Mona Reservoir	3A	3.44	PS	Temperature		
Jordan	UT16020202-012	Soldier Creek-1	Soldier Creek from confluence with Thistle Creek to confluence of Starvation Creek	3A	18.46	PS	Sediment	High	Yes
Jordan	UT16020202-012	Soldier Creek-1	Soldier Creek from confluence with Thistle Creek to confluence of Starvation Creek	3A	18.46	PS	Total Phosphorus		
Jordan	UT16020202-026	Spring Creek	Spring Creek and tributaries from confluence w/ Beer Creek to headwaters	3A	11.06	NS	Temperature		
Jordan	UT16020204-001	Jordan River-1	Jordan River from Farmington Bay upstream contiguous with the Davis County line	3C	7.60	NS	Dissolved Oxygen		

Table 10. Category 5B: River and Stream Assessment Units for which some TMDLs have been approved, but TMDLs still remain for other pollutants identified for the AU; the most recent water quality assessment indicates that water quality standards are being met; errors in previous assessments; a new delineation of an assessment unit is the cause for meeting water quality standards; or a change in the water quality standards was made and it resulted in the AU meeting standards.

Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Beneficial Use Class	Stream Miles	Beneficial Use Support	Pollutant or Pollution	Evaluation Information	Date
Assessment Unit Having Some Approved TMDLs									
Uinta	UT14060003-003	Uinta River-1	Uinta River and tributaries from the Duchesne River confluence to the Dry Gulch confluence	4	8.82	NS	Total Dissolved Solids	Approved TMDL	7-Oct-02
Assessment Units Currently Meeting Standards									
Lower Colorado	UT15010008-001	Santa Clara-1	Santa Clara River: from confluence w/Virgin River to Gunlock Reservoir	3A	23.49	FS	Temperature	Most recent survey (2001-2002), temperature was meeting standard	
Colorado River Southeast	UT14080203-008	North Creek	North Creek and tributaries from confluence w/Montezuma Creek to headwaters	2B,3A,4	12.72	FS	pH	Most recent survey (2002-2003), pH was meeting standard	
Colorado River Southeast	UT14030005-002	Indian Creek-2	Indian Creek from Newspaper Rock north boundary to headwaters	3A	14.72	FS	pH	Most recent survey (2002-2003), pH was meeting standard	
Uinta	UT14060003-008	Lake Fork-1	Lake Fork River and tributaries from confluence Duchesne River to Pigeon Water Creek confluence.	4	22.36	FS	Temperature	Most recent survey (2000-2001), temperature was meeting standard.	
Jordan River / Utah Lake	UT16020201-002	American Fork River-2	American Fork River and tributaries from Tibble Fork Dam to headwaters	3A	30.80	FS	Arsenic	Health advisory for arsenic in fish tissue was removed from this assessment unit.	
Lower Colorado	UT15010010-002	Beaver Dam Wash	Beaver Dam Wash from Matoqua to headwaters	3B	8.51	FS	Temperature	Study by DWQ in 2001, classification changed from 3A to 3B, meets temperature standard	
Colorado River Southeast	UT14080201-004	Johnson Creek	Johnson Creek and tributaries from confluence with Recapture Creek to	2B,1C,3A,4	3.9	FS	pH	Survey of 2002-2003, pH meeting standard, not	

Appendix H
Assessment Protocols for Listing and Delisting

II. METHODOLOGY FOR DEVELOPING THE 303(d) LIST

The purpose of this section is to describe the methods and decision-making process used to identify and list water quality limited assessment units needing TMDLs, as well as the criteria used to de-list assessment units previously identified in any of the State's previous TMDL lists.

A. Division of Water Quality Programs Involved In Identifying Impaired Waters.

1. Utah Pollutant Discharge Elimination System Program (UPDES) - Any receiving AU (lake, reservoir, river, stream) on which a facility is located that requires a Utah Pollutant Discharge Elimination System discharge permit renewal between April 1, 2004 and March 31, 2006 for pollutants that are not controlled through technology-based requirements or end-of-pipe requirements was listed. The assessment units identified and associated with the UPDES permit dischargers are water quality limited, which means a TMDL is needed to determine proper water quality-based limits to assure water quality standards are maintained or attained. **Listing of permittees and pollutants doesn't imply that the receiving water is currently violating any of the State's water quality standards.** Total Maximum Daily Load Analyses are calculated to determine the degree of treatment that must be performed before the effluent can be discharged to assure the receiving water quality and its beneficial use designations are maintained.

2. Lake Water Quality Assessment and Clean Lakes Programs (314) - Any lake or reservoir identified as partially supporting or not supporting one or more of its beneficial uses through either one of these programs was evaluated for listing.

3. Stream Water Quality Assessment and Nonpoint Source Programs (319) - Any stream or stream segment identified as partially supporting or not supporting one or more of its beneficial uses through either one of these programs was evaluated for listing.

4. Cooperative Monitoring Program - The Division of Water Quality has Memorandums of Agreement with the U.S. Forest Service and U.S. Bureau of Land Management to cooperate in the monitoring of the waters of the State. Agreements have also been made with other entities to monitor and collect data to be used in assessing waters for preparation of the 303(d) list. Any AU identified using data from the cooperative monitoring program as not meeting its beneficial uses was evaluated for listing.

B. Criteria for Listing Assessment units on 303(d) List.

As stated above, assessment units with permit renewals between April 1, 2004 and March 31, 2006 were listed for pollutants that are not controlled through technology-based requirements or end-of-pipe requirements.

Beneficial use support was determined by comparing data against the standards and indicators for the designated beneficial uses listed in Table 1. Narrative standards were also used to determine beneficial use support.

Table 1. Designated Beneficial Uses for River Streams, Lakes, and Reservoirs,	
Class	**Definition**
1	Protected for use as a raw water source for domestic water systems.
1C	Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
2	Protected for recreational use and aesthetics.
2A	Protected for primary contact recreation such as swimming.
2B	Protected for secondary contact recreation such as boating, wading, or similar uses.
3	Protected for use by aquatic wildlife.
3A	Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
3B	Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
3C	Protected for nongame fish and other aquatic life, including he necessary aquatic organisms in their food chain.
3D	Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
3E	Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.
4	Protected for agricultural uses including irrigation of crops and stock watering.
5	The Great Salt Lake. Protected for primary and secondary contact recreation, aquatic wildlife, and mineral extraction.

Tables 2 through 6 are the listing criteria used to compare data against standards and pollution indicators found in *Standards of Quality for Waters of the State, R317-2, Utah Administrative Code (DEQ, 2001)* to determine beneficial use support of assessment units that are not listed because of a UPDES discharge permit renewal. For lakes and reservoirs, the same criteria are used with the exception of the tables for conventional parameters; pH, dissolved oxygen and temperature; for 3A (cold water game fish), 3B (warm water game fish) and 3C (warm water non-game fish). Additional criteria for determining beneficial use support for lakes and reservoirs are explained in the last part of this section. The total phosphorus method for identifying waters as needing further study is not applied to lakes and reservoirs or large rivers such as the Green River and Colorado River.

The State of Utah exercises discretion in using data or information that goes beyond the criteria listed in the following tables and/or narrative for listing assessment units and can include other types of information and best professional judgment.

Table 2. Criteria for Assessing Water as a Source of Drinking Water-Class 1C		
Degree of Use Support	**Field Monitoring (Toxicants)**	**Restrictions**
Full	For any one pollutant, no more than one violation of criterion.	No source water closures or advisories
Partial	For any one pollutant, two or more violations of the criterion, but violations occurred in ≤10% of the samples.	One or more drinking water source advisories lasting less than 30 days per year.
Non	For any one pollutant, two or more violations of the criterion, and violations occurred in more than 10% of the samples.	One or more drinking water source advisories lasting greater than 30 days.

Table 3. Criteria for Assessing Primary and Secondary Contact Beneficial Use - Class 2A and 2B		
Degree of Use Support	**Restrictions**	**Fecal Coliform Bacteria**
Full	No bathing area closures or restrictions in effect during reporting period.	Criterion 1 and Criterion 2 met.
Partial	On average, one bathing area closure per year of less than one week's duration.	Geometric mean met; not more than 25 percent of samples exceed 400 per 100 ml.
Non	On average, one bathing area closure per year of greater than one week's duration, or more than one bathing area closure per year.	Neither geometric mean nor maximum criteria limits achieved.

Bacterial Criterion

Criterion 1 = The geometric mean should not exceed 200 per 100 mL for any 30-day period. At least 5 samples should be collected in any 30-day period to be used in an assessment. The State prefers that at least 10 samples be collected during any 30-day period. When less than ten samples are collected, the State will look at historical data if available and/or other information before determining beneficial use support.

Criterion 2 = Not more than 10 percent of the total samples taken during any 30-day period should have fecal coliform density that exceeds 400 per 100 mL. At least 5 samples should be collected in any 30-day period to be used in an assessment. The State prefers that at least 10 samples be collected during any 30-day period. For less than ten samples, there must be at least two samples that exceed the criterion and the State will look at historical data if available and/or other information before determining beneficial use support.

Table 4. Criteria for Assessing Aquatic Life Beneficial Use Support – Classes 3A, 3B, 3C, 3D	
Degree of Use Support	**Conventional Parameters (pH, DO, Temperature)**
Full	For any one pollutant, criterion was exceed only once or was not exceeded in < 10% of the samples if the criterion was exceeded at least two times.
Partial	For any one pollutant, criterion was exceeded two times, and criterion was exceeded in more than 10% but not more than 25% of the samples.
Non	For any one pollutant, criterion was exceeded two times, and criterion was exceeded in more than 25% of the samples.

Table 5. Toxic Parameters (priority pollutants, chlorine, and ammonia			
Criteria	**Number of Samples**	**Degree of Support**	
Acute	4 or more	Full	For any one pollutant, no more than one violation of acute criteria within a 3-year period.
		Partial	For any one pollutant, two or more violations of the acute criterion, but violations occurred in ≤10% of the samples 3-year period.
		Non	For any one pollutant, two or more violations of the acute criterion, and violations occurred in more than 10% of the samples within a 3-year period.
Chronic	10 or more	Full	For any one pollutant, less than two exceedances of criterion within a 3-year period.
	Less than 10	Partial	Standard is multiplied by 1.75 to determine the listing value. For anyone pollutant, 3 or more exceedances in a 3-year period.*
	10 or more	Non	For any one pollutant, 3 or more violations of the chronic criterion within a 3-year period.

*This listing methodology for chronic levels of toxicants when less that 10 samples are used for assessment was developed following EPA's overwhelming evidence guidance.

Note: If more than 3 years of data are available, EPA guidelines allow for one additional exceedance when determining beneficial use support.

Table 6. Criteria for assessing Agricultural Beneficial Use Support - Class 4		
Degree of Use Support	**Conventional Parameter (Total Dissolved Solids)**	**Toxic Parameters**
Full	Criterion exceeded in less than two samples or was exceeded in < 10% of the samples when the criterion was exceeded at least twice.	For any one pollutant, no more than one violation of criterion.
Partial	Criterion was exceeded at least two times, and criterion was exceeded in more than 10% but not more than 25% of the samples.	For any one pollutant, two or more violations of the criterion, but violations occurred in ≤10% of the samples.
Non	Criterion was exceeded at least two times, and criterion was exceeded in more than 25% of the samples.	For any one pollutant, two or more violations of the criterion, and violations occurred in more than 10% of the samples.

C. Additional Criteria for Listing Lakes and Reservoirs.

The criteria for listing lakes and reservoirs under Class 1C (source of drinking water), 2A (recreation), and Class 4 (agricultural use) are the same as listed in Tables 2, 3, and 6. Several factors were considered in the assessment for beneficial use support. The monitoring program for lakes and reservoirs is designed to determine a basic water quality characterization and evaluate the productivity during the summer period. Additional winter monitoring is conducted to evaluate dissolved oxygen deficiencies as indicated by the summer monitoring. Water quality standards are evaluated to assess impairment for waters classified in Classes 2 (recreation), 3(aquatic life), and 4 (agriculture).

The following procedure was used to evaluate Class 3 (aquatic life) beneficial use:

Three basic parameters that are compared to standards in addition to other specific parameters include dissolved oxygen, pH, and temperature. These basic parameters are obtained in the field as part of the overall monitoring program for Utah's lakes and reservoirs. The data for these three parameters are analyzed for the entire water column and evaluated according to current 305(b) guidelines. A comparison of water column values with State standards is determined as follows. For any one pollutant or stressor, criteria exceeded in less than or equal to 10 percent of measurements, a designation of fully supporting was assigned. For any one pollutant or stressor, criteria exceeded in greater than 10, but less than or equal to 25 percent of measurements, a designation of partially supporting was assigned. For any one pollutant or stressor, criteria exceeded in greater than 25 percent of measurements a designation of not supporting was assigned. An exception to these guidelines has been provided for dissolved oxygen. The dissolved oxygen criterion has been defined using the 1-day minimum dissolved oxygen concentration of 4.0 mg/l. State standards account for the fact that anoxic or low dissolved oxygen conditions may exist in the bottom of deep reservoirs and therefore, the

dissolved oxygen standard is applied as follows. When the concentration is above 4.0 mg/l for greater than 50% of the water column depth, a fully supporting status is assigned. When 25-50% of the water column is above 4.0 mg/l, it is designated as partial supporting and when less than 25% of the water column exceeds the 4.0 mg/l criteria, it is designated as not supporting its defined beneficial use. Having determined support status for individual pollutants or stressors, an overall use support designation was determined based on a combination of the individual pollutant or stressor support designations. A 'not supporting' status was assigned to a body of water when at least two of the basic criteria (dissolved oxygen, pH or temperature) were found to be not supportive. A 'fully supporting' status was assigned when all of the criteria were found to be fully supporting. All other assessment units were assigned a 'partially supporting' status for criteria found in the various remaining combinations. The initial support status may be modified through an evaluation of the trophic state index (TSI), winter dissolved oxygen conditions with reported fish kills, and the presence of significant blue green algal populations in the phytoplankton community. This evaluation, although based to an extent on professional judgment, could shift initial support status ranking downward if two of the three criteria indicate there is was impairment in the water quality.

A final determination to list the AU is made through an evaluation of assessment trends since 1989. It is necessary to incorporate such an evaluation to incorporate the hydrology and seasonality associated with lakes and reservoirs. In general, if an AU exhibits a consistent status of 'partial supporting' or 'not supporting', it should be listed on the 303(d) list. However, some assessment units appear to be borderline and there is a mixture of partially and fully supporting conditions over the period of study. Therefore, two consecutive evaluation cycles in any particular support status are required for addition to or removal from the 303(d) list.

D. Biological and Habitat Data

Biological and habitat data were used on a limited basis to supplement water chemistry data in determining beneficial use support. Phytoplankton data were used to assess lake and reservoir water quality.

E. Criteria for Removing Assessment Units from the Category 5A (303(d) List).

1. An AU was placed on list due to error in assessment or because an AU was listed incorrectly in place of another AU or any other error not based on water quality assessment.

2. The most recent data assessment indicates that the AU is supporting all of its designated beneficial uses.

3. A total maximum daily load analysis has been completed and approved by EPA.

4. An existing AU delineation has changed.

    a. An AU has been changed by dividing it into several assessment units.

b. The AU boundaries have been changed and it is now a part of a different AU or portions of the AU are included in newly defined assessment units.

5. A change in the method(s) of determining beneficial use support. The methodology change would cause the assessment to indicate that all beneficial uses assessed are fully supported.

6. A change in State water quality standards or pollution indicator values.

A change in the standards or pollution indicators would change assessment to fully supporting all beneficial uses that have sufficient data to be assessed.

7. A determination that insufficient amounts of data were collected to place the AU on the list originally, e.g., too few samples collected to make a reliable determination of beneficial use support.

8. Utah exercises discretion in using data or information that goes beyond the criteria listed above in determining whether to de-list an AU and can include other types of information and best professional judgment.

XX) Appendices Map

Main Website: http://waterquality.utah.gov/

Appendix A – Found in Utah Water Quality Assessment Report to Congress 2002 at http://waterquality.utah.gov/documents/full_2002305b.pdf
- See pages VI-1 through VI-3.

Appendix B – Found in Rule R317-2. Standards of Quality for Waters of the State at http://www.rules.utah.gov/publicat/code/r317/r317-002.htm#T15
- See tables in R317-2-14 Numeric Criteria

Appendix C – Found in Rule R317-2. Standards of Quality for Waters of the State at http://www.rules.utah.gov/publicat/code/r317/r317-002.htm#T15
- See R317-2-13. Classification of Waters of the State. (example from Upper Colorado River)

Appendix D – not available

Appendix E – Found on a PDF created by the EPA entitled "Summary of Bioassessment Programs and Biocriteria Development" – Dec. 2002.
http://www.epa.gov/bioindicators/pdf/UT_summary_final.pdf

Appendix F - Found in Utah's 2004 303(d) located at
http://waterquality.utah.gov/documents/2004303dlistFINALall-11-04-04.pdf
- See section II , pages 2-3

Appendix G - Found in Utah's 2004 303(d) located at
http://waterquality.utah.gov/documents/2004303dlistFINALall-11-04-04.pdf
- See section VII, pages 27-28 and 53

Appendix H - Found in Utah's 2004 303(d) located at
http://waterquality.utah.gov/documents/2004303dlistFINALall-11-04-04.pdf
- See section II, pages 11-17

The Clean Water Act: WYOMING

I) WQD and State Review Process

The Water Quality Division (WQD) of the Wyoming Department of Environmental Quality is responsible for upholding the water quality of the state's waters via the Clean Water Act processes. Such processes are explained in this document along with Wyoming's specific procedures

The Watershed Planning Program is responsible for a variety of planning and water quality project implementation activities. The major functions include Water Quality Standards, Non-point Source Planning and Grant Administration, Water Quality Assessment, 401 Certifications and Wetlands Protection, TMDL Coordination, and Data Quality Assurance.

Triennial Review:

Surface water classifications and site specific criteria are revised in Wyoming on an ongoing basis. Many of these modifications are based upon structured studies called Use Attainability Analyses (UAA). The table that follows shows the status of any required administrative action for each UAA conducted in Wyoming beginning in July 2001. Associated documents can be viewed or downloaded by selecting the appropriate links.

UAA	*Proposed Change*	*Public Notice*	*WQD Action*	*EQC Action*	*EPA Action*	*Status*
Sand Creek (near Lysite Big Horn River Basin) 29MB	Classification 3B to 4B	11/27/2001 Comments	Approved 3/27/2002	N/A	Approved 6/11/2002	Final
Isolated Waters (Statewide-Categorical)	Classification 4C	12/7/2001 Comments	Approved 4/22/2002	Pending Appeal	N/A	Pending
Coal Draw (near Thermopolis), Big Horn Basin	Classification 3B to 4B (upper reaches) 4C (lower reaches)	9/6/02 Comments	Approved 12/5/02	N/A	Disapproved 3/5/03	Pending
Red Creek, Great Divide Basin	Classification 3B to 4B	9/6/02 Comments	Approved 11/7/02	N/A	Approved 5/8/03	Final
Whitetail Creek, Little Powder Basin	Classification 3B to 4B	12/6/02 Comments	Approved 8/6/03	N/A	Pending	Pending

Unnamed Trib to Whitetail Cr, Little Powder Basin	Classification 3B to 4C	12/6/02 Comments	Approved 8/6/03	N/A	Pending	Pending
Gooseberry Cr, Bighorn Basin	Classification 2AB to 2B (upper reaches) 2C (lower reaches)	1/15/03 Comments	Approved 8/6/03	N/A	Pending	Pending
Rawhide Cr, Bighorn Basin	Classification 2AB to 2B (upper reaches) 2C (lower reaches)	1/15/03 Comments	Approved 8/6/03	N/A	Pending	Pending

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III) List of Designated Uses

The objectives of the Wyoming pollution control program are to provide, wherever attainable, the highest possible water quality commensurate with the following uses:

1) Agriculture: For purposes of water pollution control, agricultural uses include irrigation or stock watering.

2) Fisheries: The fisheries use includes water quality, habitat conditions, spawning and nursery areas, and food sources necessary to sustain populations of game and nongame fish. This use does not include the protection of exotic species which are designated "undesirable" by the Wyoming Game and Fish Department or the U.S. Fish and Wildlife Service within their appropriate jurisdictions.

3) Industry: Industrial use protection involves maintaining a level of water quality useful for industrial purposes.

4) Drinking water: The drinking water use involves maintaining a level of water quality that is suitable for potable water or intended to be suitable after receiving conventional drinking water treatment.

5) Recreation: Recreational use protection involves maintaining a level of water quality which is safe for human contact. It does not guarantee the availability of water for any recreational purpose.

6) Scenic value: Scenic value use involves the aesthetics of the aquatic systems themselves (odor, color, taste, settleable solids, floating solids, suspended solids, and solid waste) and is not necessarily related to general landscape appearance.

7) Aquatic life other than fish: This use includes water quality and habitat necessary to sustain populations of organisms other than fish in proportions which make up diverse aquatic communities common to the waters of the state. This use does not include the protection of insect pests or exotic species which may be considered "undesirable" by the Wyoming Game and Fish Department or the U.S. Fish and Wildlife Service within their appropriate jurisdictions and human pathogens.

8) Wildlife: The wildlife use includes protection of water quality to a level which is safe for contact and consumption by avian and terrestrial wildlife species.

9) Fish consumption: The fish consumption use involves maintaining a level of water quality that will prevent any unpalatable flavor and/or accumulation of harmful substances in fish tissue.

Surface Water Classes and Uses. The following water classes are a hierarchical categorization of waters according to existing and designated uses. Except for Class 1 waters, each classification is protected for its specified uses plus all the uses contained in each lower classification. Class 1 designations are based on value determinations rather than use support and are protected for all uses in existence at the time or after designation. There are four major classes of surface water in Wyoming with various subcategories within each class (see “Wyoming Surface Water Classification List” for current listing).

1) Class 1, Outstanding Waters. Class 1 waters are those surface waters in which no further water quality degradation by point source discharges other than from dams will be allowed. Nonpoint sources of pollution shall be controlled through implementation of appropriate best management practices. Pursuant to Section 7 of these regulations, the water quality and physical and biological integrity which existed on the water at the time of designation will be maintained and protected. In designating Class 1 waters, the Environmental Quality Council shall consider water quality, aesthetic, scenic, recreational, ecological, agricultural, botanical, zoological, municipal, industrial, historical, geological, cultural, archaeological, fish and wildlife, the presence of significant quantities of developable water and other values of present and future benefit to the people.

2) Class 2, Fisheries and Drinking Water. Class 2 waters are waters, other than those designated as Class 1, that are known to support fish or drinking water supplies or where those uses are attainable. Class 2 waters may be perennial, intermittent or ephemeral and are protected for the uses indicated in each sub category listed below. There are four subcategories of Class 2 waters.

a. Class 2AB. Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable. Class 2AB waters include all permanent and seasonal game fisheries and can be either "cold water" or "warm water" depending upon the predominance of cold water or warm water species present. All Class 2AB waters are designated as cold water game fisheries unless identified as a warm water game fishery by a "ww" notation in the “Wyoming Surface Water Classification List”. Unless it is shown otherwise, these waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected for that use. Class 2AB waters are also protected for nongame fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value uses.

b. Class 2A. Class 2A waters are those that are not known nor have the potential to support game fish but are used for public or domestic drinking water supplies, including their perennial tributaries and adjacent wetlands. Uses designated on Class 2A waters include drinking water, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value.

c. Class 2B. Class 2B waters are those known to support or have the potential to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where it has been shown that drinking water uses are not attainable pursuant to the provisions of Section 33. Class 2B waters include permanent and seasonal game fisheries and can be either "cold water" or "warm water" depending upon the predominance of cold water or warm water species present. All Class 2B waters are designated as cold water game fisheries unless identified as a warm water game fishery by a "ww" notation in the “Wyoming Surface Water Classification List”. Uses designated on Class 2B waters include game and nongame fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture and scenic value.

d. Class 2C. Class 2C waters are those known to support or have the potential to support only nongame fish populations or spawning and nursery areas at least seasonally including their perennial tributaries and adjacent wetlands. Class 2C waters include all permanent and seasonal nongame fisheries and are considered "warm water". Uses designated on Class 2C waters include nongame fisheries, fish consumption, aquatic life other than fish, primary contact recreation, wildlife, industry, agriculture, and scenic value.

3) Class 3, Aquatic Life Other than Fish. Class 3 waters are waters, other than those designated as Class 1, that are intermittent, ephemeral or isolated waters and because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning, or certain perennial waters which lack the natural water quality to support fish (e.g., geothermal areas). Class 3 waters

provide support for invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. Uses designated on Class 3 waters include aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value. Generally, waters suitable for this classification have wetland characteristics, and such characteristics will be a primary indicator used in identifying Class 3 waters. There are three subcategories of Class 3 waters.

a. Class 3A. Class 3A waters are isolated waters including wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable.

b. Class 3B. Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. In general, 3B waters are characterized by frequent linear wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. Such characteristics will be a primary indicator used in identifying Class 3B waters.

c. Class 3C. Class 3C waters are perennial streams without the natural water quality potential to support fish or drinking water supplies but do support wetland characteristics. These may include geothermal waters and waters with naturally high concentrations of dissolved salts or metals or pH extremes.

4) Class 4, Agriculture, Industry, Recreation and Wildlife. Class 4 waters are waters, other than those designated as Class 1, where it has been determined that aquatic life uses are not attainable pursuant to the provisions of Section 33 of these regulations. Uses designated on Class 4 waters include primary contact recreation, wildlife, industry, agriculture and scenic value.

a. Class 4A. Class 4A waters are artificial canals and ditches that are not known to support fish populations.

b. Class 4B. Class 4B waters are intermittent and ephemeral stream channels that have been determined to lack the hydrologic potential to normally support and sustain aquatic life pursuant to the provisions of Section 33(b) of these regulations. In general, 4B streams are characterized by only infrequent wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. Such characteristics will be a primary indicator used in identifying Class 4B waters.

c. Class 4C. Class 4C waters are all waters that have been determined to lack the potential to normally support and sustain aquatic life pursuant to the provisions of Section 33(b)(i), (iii), (iv), (v), and (vi) of these regulations. Class 4C includes, but is not limited to effluent-dominated

streams where it has been determined under Section 33(b)(iii) that removing a source of pollution to achieve full attainment of aquatic life uses would cause more environmental damage than leaving the source in place.

5) Specific stream segment classifications are contained in a separate document entitled "Wyoming Surface Water Classification List" which is published by the department and periodically revised and updated according to the provisions of sections 4, 33, 34, 35 and Appendix A of this chapter. Class 1 waters are those waters that have been specifically designated by the Environmental Quality Council. Class 2 designations are based upon the fisheries information contained in the Wyoming Game and Fish Department's "Stream and Lakes" inventory database as submitted to the Department of Environmental Quality in June, 2000. This database represents the best available information and is considered conclusive. Class 4 designations are based upon knowledge that a water body is an artificial, man made conveyance, or has been determined not to support aquatic life uses through an approved Use Attainability Analysis. All other waters are designated as Class 3A or 3B. New information made available to the department may be cause to amend the classifications.

For criteria used to determine if water quality for beneficial uses are met, see Appendix A.

Wyoming began using the same methodology for both the 305(b) and 303(d) processes in 2000, using publicly reviewed methodology. The methodology meets all requirements of Wyoming's "credible data" law. This methodology has been updated and was again available for public comment along with this report and the 303(d) List. "Wyoming's Method for Determining Water Quality Condition of Surface Waters" is available at http: //deq.state.wy.us/wqd/Downloads/events/2-2223-doc.pdf.

IV) Water Quality Classified Uses and Antidegradation Policy

For Wyoming's Antidegradation Policy see a separate document entitled "Antidegradation Policies by State."

V) Basic Standards / Criteria

"Acute value" means the one hour average concentration. The EPA has determined that this value, if not exceeded more than once every three years on average, should not result in unacceptable effects on freshwater aquatic organisms and their uses. Acute values represent a response to a stimulus severe enough to induce a rapid reaction, typically in 96 hours or less.

"Chronic value" means the four day average concentration. The EPA has determined that this value, if not exceeded more than once every three years on average, should not result in unacceptable effects on freshwater aquatic organisms and their uses. Chronic values represent a response to a continuous, long-term stimulus.

Numeric water quality standards are enforced at all times except during periods below low flow. Low flow can be determined by using the 7Q10 (the minimum seven consecutive day flow which has the probability of occurring once in ten years) for acute exposures; or the EPA's biologically based flow method which determines a four day, three year low flow for chronic exposures and a one day, three year low flow for acute exposures; or other defensible scientific methods.

During periods when stream flows are less than the minimums described above, the department may, in consultation with the Wyoming Game and Fish Department and the affected discharger(s), require permittees to institute operational modifications as necessary to insure the protection of aquatic life. This section should not be interpreted as requiring the maintenance of any particular stream flow.

For the numeric standards for priority, non-priority pollutants, and site-specific criteria see Appendix B

Wyoming lists its narrative standards individually in the Surface Water Quality Standards for the following items:

- Section 12. **Protection of Wetlands**.
- Section 13 **Toxic Materials**
- Section 14 **Dead Animals and Solid Waste**
- Section 15. **Settleable Solids**
- Section 16. **Floating and Suspended Solids**
- Section 17. **Taste, Odor and**
- Section 18. **Human Health**
- Section 19. **Industrial Water Supply**
- Section 20. **Agricultural Water Supply**
- Section 21. **Protection of Aquatic Life**
- Section 22. **Radioactive Material**
- Section 23. **Turbidity**
- Section 24. **Dissolved Oxygen**
- Section 25. **Temperature**
- Section 26. **pH**
- Section 27. **Fecal Coliform Bacteria**
- Section 28. **Undesirable Aquatic Life**
- Section 29. **Oil and Grease**
- Section 30. **Total Dissolved Gases**
- Section 31. **Salinity**
- Section 32. **Biological Criteria**

Wyoming's Surface Water Quality Standards can be found at http://deq.state.wy.us/wqd/watershed/11567-doc.pdf

VI) Assessment Protocols Used to Determine Standards

For determination of the parameters involved in the standards, analyses will be in accordance with test procedures defined pursuant to: Title 40, Code of Federal

Regulations, Part 136, or any modifications thereto. For test procedures not listed in the Code of Federal Regulations, test procedures outlined in the latest editions of: EPA Methods for Chemical Analysis of Water and Wastes; or, Standard Methods for the Examination of Water and Wastewaters; or, ASTM Standards, Part 31, Water shall be used.

VII) Stream Segmentation System

The following water classifications are based upon the provisions of Chapter 1 of the Wyoming Water Quality Rules and Regulations - Surface Water Standards, specifically Sections 4, 33, 34, 35 and Appendix A.

ALL SURFACE WATERS IN WYOMING ARE CLASSIFIED AS FOLLOWS:

1) **Class 1 Waters.** The following waters are designated Class 1:

   a. All surface waters located within the boundaries of national parks and congressionally designated wilderness areas as of January 1, 1999;

   b. The main stem of the Snake River through its entire length above the U.S. Highway 22 Bridge (Wilson Bridge);

   c. The main stem of the Green River, including the Green River Lakes from the mouth of the New Fork River upstream to the wilderness boundary;

   d. The Main Stem of the Wind River from the Wedding of the Waters upstream to Boysen Dam;

   e. The main stem of the North Platte River from the mouth of Sage Creek (approximately 15 stream miles downstream of Saratoga, Wyoming) upstream to the Colorado state line;

   f. The main stem of the North Platte River from the headwaters of Pathfinder Reservoir upstream to Kortes Dam (Miracle Mile segment);

   g. The main stem of the North Platte River from the Natrona County Road 309 bridge (Goose Egg bridge) upstream to Alcova Reservoir;

   h. The main stem of Sand Creek above the U.S. Highway 14 bridge;

   i. The main stem of the Middle Fork of the Powder River through its entire length above the mouth of Buffalo Creek;

   j. The main stem of the Tongue River, the main stem of the North Fork of the Tongue River, and the main stem of the South Fork of the Tongue River above the U.S. Forest Service Boundary;

   k. The main stem of the Sweetwater River above the mouth of Alkali Creek;

l. The main stem of the Encampment River from the northern U.S. Forest Service boundary upstream to the Colorado state line;

m. The main stem of the Clarks Fork River from the U.S. Forest Service boundary upstream to the Montana state line;

n. All waters within the Fish Creek (near Wilson, Wyoming) drainage;

o. The main stem of Granite Creek (tributary of the Hoback River) through its entire length;

p. Fremont Lake;

q. Wetlands adjacent to the above listed Class 1 waters.

2) **Classification Tables**. The tables that follow in this document contain a listing of individual water classifications for many of the larger waterbodies in each major river basin in the state. In addition to the listings contained herein, the following provisions apply:

a. **National Parks and Wilderness Areas.** All surface waters located within the boundaries of Yellowstone and Grand Teton National Parks and congressionally designated wilderness areas as of January 1, 1999 are Class 1 waters. Such Class 1 designation always takes precedence over the classification given in the listing. For example, Dinwoody Creek is shown as a Class 2 water; however, the upper portions are within a wilderness area and those portions are Class 1. The portion below the wilderness boundary is Class 2.

b. **Unlisted Waters.** The waters contained in the classification tables are all waters which are named on the USGS 1:500,000 hydrologic map of Wyoming and those otherwise classified by the Department. The classification list does not contain an exhaustive listing of all the surface waters in the state. Those waters which are not specifically listed are classified as follows:

i. All waters shown as having any species of game fish present in the Wyoming Game and Fish Department's *Streams and Lakes Database1* as submitted to the Department of Environmental Quality in June,2000 are classified as 2AB;

ii. All waters shown as having only nongame fish species present in the Wyoming Game and Fish Department's *Streams and Lakes Database* as submitted to the Department of Environmental Quality in June,2000 are classified as 2C;

iii. All other waters shall be classified as follows:

1. Those waters supported by an approved UAA containing defensible reasons for not protecting aquatic life uses shall be 4A, 4B or 4C;

2. The remaining waters shall be 3A, 3B or 3C.

iv. Wetlands. All adjacent wetlands shall have the same classification as the water to which they are adjacent.

The "Streams and Lakes Fish Inventory Database" used to derive these classifications is available upon request from the Wyoming Department of Environmental Quality, Water Quality Division, 122 W. 25th Street, Cheyenne, Wyoming or can be downloaded from the Water Quality Division's web page.

For an example Table of Wyoming Water Segment Classification see Appendix C

VIII) Treatment of Water Column

The quality of the water column is subject to both narrative and numeric standards as listed above in V) Basic Standards/Criteria and shown in Appendix B. These criteria are applied to sections of watersheds based on their use, as shown in Appendix C.

IX) Treatment of Physical Habitat

The following narrative standard is found in the 2002 305(b) list:

As healthy streams flow through different types of terrain, they have certain characteristics which can generally be predicted based on climate, flow regimes, substrate, valley shape, gradient, and other landscape features. Perhaps the most important attribute common to healthy streams in any environment is stream stability. Although streams are always changing somewhat, a healthy stream is relatively stable from one year to the next, in all flow regimes, from floods to low flows or even no flows. Stable streams have the ability to transport sediment loads under bankfull conditions without significant erosion or in stream sediment deposition. Because of this stability, aquatic organisms can establish themselves without being eradicated by severe scouring from floods or by excessive sediment deposition - thus they have good "habitat" to live in. A stable stream also has a variety of habitats and physical features which provide living space for more age groups of fish and diverse communities of aquatic organisms. From a water quality standpoint, it will trap and remove sediment and nutrients in the flood plain and riparian area during high flows, which improves instream water quality for aquatic life, while benefiting riparian plants, which in turn benefit livestock and wildlife.

Not only does a stream in good physical condition benefit aquatic life, but it also reduces flood damage to adjacent property, and provides better sub-irrigation and production in valuable bottom lands. Because of the moisture holding capability of a healthy riparian system, peak flows are reduced and stream flow continues longer in the season, which is good for both aquatic life as well as users of the stream water.

Because these processes and effects are so interlinked, a physically degraded stream will nearly always exhibit more than one physical problem. For example, a stream with severely eroding banks will also usually be wider and shallower than a stream in good condition. Depending on the flow regime, it will also probably have areas of excessive in

stream sediment deposition as well as areas of high sediment transport which do not allow many stable areas for aquatic life to live. Generally, there will also be less variety of aquatic habitat. These physical and habitat problems are often compounded because the stream can be more prone to developing anchor ice in the winter and can also have higher summer temperatures. Obviously the end result has a large impact on the biological community.

When DEQ conducts stream assessments, chemical, physical and biological conditions are examined and compared with the ranges of conditions expected, based on a suite of references streams with similar geology, flow regimes, substrate, valley shape, gradient, and other landscape features. If, using a weight of evidence approach, a stream without chemical problems has substantially degraded physical and habitat features, with a resulting degraded biological community, it is considered impaired due to physical degradation of the aquatic habitat. For the purposes of 305(b) reporting and the 303(d) listing process, the combination of those degraded physical and habitat conditions is summed up in the broad term “Habitat Degradation”.

X) Treatment of Sediment

Wyoming has adopted a narrative sediment criterion that reads:

Section 15. **Settleable Solids**. In all Wyoming surface waters, substances attributable to or influenced by the activities of man that will settle to form sludge, bank or bottom deposits shall not be present in quantities which could result in significant aesthetic degradation, significant degradation of habitat for aquatic life or adversely affect public water supplies, agricultural or industrial water use, plant life or wildlife.

See also IX) Treatment of Physical Habitat, and Appendix D.

XI) Treatment of Biological

Wyoming has adopted a narrative biological criterion that reads:

Section 32. **Biological Criteria**. Class 1, 2 and 3 waters of the state must be free from substances, whether attributable to human-induced point source discharges or nonpoint source activities, in concentrations or combinations which will adversely alter the structure and function of indigenous or intentionally introduced aquatic communities. The primary objective of bioassessments conducted by the Wyoming Department of Environmental Quality (WYDEQ) is to assess the support of aquatic life for 303(d) listing and 305(b) reporting, using macroinvertebrates as the primary indicator. The program has been in existence since 1993, when it was initiated in the form of the Reference Stream Project (RSP). The primary goal of the RSP was to collect baseline biological data at least-impacted (reference) streams in each ecoregion of Wyoming as a benchmark for assessing biological and water quality conditions of other streams across the State. In 1998, the focus shifted from collecting reference stream data to using RSP data as a benchmark to assess biological conditions of other Wyoming streams as part of the Beneficial Use Reconnaissance Program (BURP). BURP uses a comprehensive approach (chemical, physical, and biological components) to assess water quality

conditions of Wyoming streams. Today, the RSP is still ongoing, but at a much smaller scale.

Several other organizations have been or will be important sources of bioassessment data in Wyoming. The Wyoming Association of Conservation Districts (WACD) has been very involved in collecting biological data at streams across Wyoming. With proper guidance, local Conservation Districts (CDs) can elect to assume some of WYDEQ's bioassessment responsibilities, with the data being used for 303(d) and 305(b). Many CDs have welcomed the opportunity to collect bioassessment data. The USGS also has been a very important source of biological data. Wyoming has contracted the USGS-Wyoming District to carry out the Environmental Monitoring and Assessment Program (EMAP) monitoring in Wyoming. Approximately 50 randomly selected sites will be assessed over the four year contract, with the end goal being an unbiased estimate of water quality conditions in the State. The USGS also conducted an assessment of the Yellowstone River Basin of Wyoming and Montana as part of the National Water-Quality Assessment Program (NAWQA).

The considerable amount of biological data generated from these studies is being evaluated for comparability with WYDEQ data to explore the usefulness of these data for 305(b) purposes. In addition, joint-funding agreements are in place with the USGS that allow for enhanced biological monitoring of streams in areas affected by coal bed methane development. The Wyoming Game and Fish Department (WGFD) is an important source of fish data. WYDEQ has chosen not to sample fish communities as part of bioassessments, but uses WGFD data for determining support of fisheries uses, as well as in classifying streams for assignment of uses and designating appropriate water quality standards associated with those uses.

Wyoming has made significant strides in recent years in the development of multimetric biocriteria. Work will continue toward refining the existing numeric criteria and narrative aquatic life standard, and toward the eventual implementation of numeric aquatic life standards. Implementation of numeric standards is sure to be a challenging effort. The physical heterogeneity of Wyoming (e.g., climate, landscape, land use, and geology) poses significant scientific challenges. Political considerations are also likely to pose challenges. Currently, WY is exploring the use of predictive models for assessing biological conditions of streams, as well as the addition of periphyton as an additional biological indicator to supplement macroinvertebrate data and WGFD fish data used in bioassessments. Periphyton samples have been collected at a limited number of long-term reference stations in the past, and the use of periphyton data will expand in coming years.

For specifics of Wyoming's biological assessment of its waters see Appendix E

XII) Treatment of Wetlands

For information on the Treatment of Wetlands in Colorado, see a separate document entitled "Treatment of Wetlands by State."

XIII) 305b Reports

Section 305(b) of the Clean Water Act requires that states, territories, and jurisdictions assess their water quality biennially and report those findings to the U.S. Environmental Protection Agency (EPA). EPA then summarizes the findings in a national water quality inventory. It is important to note that this report is no longer a Report to Congress, pursuant to Public Law 104-66, the Federal Reports Elimination and Sunset Act of 1995. To assess water quality, states and other jurisdictions compare their monitoring results to the water quality standards they have set for their waters. Water quality standards consist of three elements: the designated uses assigned to waters (such as drinking, swimming, or fishing), criteria to protect those uses (such as chemical-specific thresholds that should not be exceeded), and an antidegradation policy intended to keep waters that do meet standards from deteriorating from their current condition.

This data is compiled into the National Water Quality Inventory biennially. The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters.

In the 2002 305(b) list, an overview section describes the major river basins in Wyoming and summarizes water quality conditions in each basin. Each basin section is preceded with a map that shows the major water bodies and eight digit Hydrologic Units (HUCs), and highlights the approximate location of the impaired and threatened waters on the 2002 303(d) List. Each basin section is then subdivided into HUCs, referred to as watersheds in this report. Water quality conditions, based on existing data and information, are discussed in each of these watershed sections.

For Wyoming's 2002 305(b) list see: http://deq.state.wy.us/wqd/Downloads/events/2-2226-doc.pdf

The 2002 National Water Quality Inventory is the latest report available and can be accessed at www.epa.gov/305b/2000report/alhi.pdf

XIV) 303d lists

Section 303(d) of the Clean Water Act requires states to identify those water bodies, which are impaired by one or more pollutants or which are not attaining aquatic use designations due to biological information. Total Maximum Daily Loads ("TMDLs") are required for each listed water body.

PUBLIC REVIEW

The department must provide an opportunity for public comment on the proposed list and prioritization of the list before it is filed with EPA. There are two opportunities for public review. The TMDL work group, an advisory group appointed by the Director of DEQ to assist the department in TMDL matters, is provided an opportunity to review and offer suggestions to a draft of the 305b Report and 303d list. After review by the work group the list is made available to the public and a response period of 60 days is provided. DEQ will consider all comments and objections before adopting a final list. A response to public comments will be prepared. After the comments are considered and

the list finalize, the list is sent to EPA for approval. Where there is major objection to the proposed list, interested or affected parties may request a review of the final 303d list before the Water and Waste Advisory Board as outlined in the Continuing Planning Process. The advisory board may consider the comments and objections and make recommendations to the WQD.

The 2002 303(d) List is incorporated into four tables (Tables A, B, C & D). Twenty-four new segments have been added to Table A [303(d) waters with water quality impairments requiring a TMDL]. Four of these are for aquatic life use impairments, two for drinking water use impairments and eighteen for contact recreation use impairments. Twenty-six new segments have been added to Table B [303(d) Waters with Waste Load Allocation Discharge Permits Expiring] due to review of the TMDLs for ammonia, fecal coliform and chlorine. Sixteen new segments, all with contact recreation use threats, have been added to Table C [303(d) waterbodies with water quality threats]. Seventeen waterbody segments (found on Table D) are delisted from the 2000 303(d) list: all 13 waters from the 2000 Table B due to EPA approval (or expected approval) of Waste Load Allocations/TMDLs on permitted discharges; one due to a TMDL for a pollutant (ammonia); one due to current information indicating it meets the standard; one completion of a 319 project; and, one because of a standard change (arsenic).

Waterbodies in the 303(d) list are listed according to their Watershed Basin Abbreviation (ex) BF=Belle Fourche River Basin. Other column listings include:

- HUC (Hydrologic Unit)
- Name (of River of Lake)
- Class (2AB, 3B…)
- Location
- Cause of Impairment (parameter exceeded)
- Sources (point, non-point, unknown)
- Data Sources
- Uses Impaired (Aquatic Life, Contact Recreation…)
- Date listed
- Priority (low/medium/high) (For priority considerations see Appendix H)

For Wyoming's 2002 303(d) list see http://deq.state.wy.us/wqd/Downloads/events/2-2226-doc.pdf

For an example of the 2002 303(d) list see Appendix G

XV) Assessment protocols for listing and delisting

The TMDL listing process in schematic form is shown in Appendix H.

A waterbody will be delisted from the 303d list for good cause. Good cause includes, but is not limited to; more recent and accurate data, more sophisticated water quality modeling, flaws in the original analysis that led to the waterbody being listed, or changes in condition, e.g. new control equipment, elimination of discharges, or restoration of the water quality through planned projects. The determination of whether a waterbody should be delisted will follow the same analytical procedure used to list it. Monitoring will have to demonstrate that the waterbody has met designated uses for Three consecutive years.

EPA will review and approve, partially approve/disapprove, or disapprove state or territorial 303(d) lists of impaired and threatened waters requiring a TMDL (Category 5). EPA's review and approval of the 303(d) list will be based on a determination that the state's or territory's assessment and listing methodology was used to prepare the list, that the assessment and listing methodology is scientifically sound, that it is consistent with the state's or territory's water quality standards, and that the state or territory reasonably considered all existing and readily available data and information, and listed all waters not attaining water quality standards. Upon completing its review of the 303(d) list, EPA will send a letter to the state or territory notifying it of full approval, partial approval/disapproval, or disapproval. If the list is partially approved/disapproved, or disapproved, EPA will develop a list for the state or territory. EPA will also provide 30 days for public comment on the EPA developed list.

XVI) Assessment for National Point Source Discharge Elimination System (NPDES) permits

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality.

Wyoming is a delegated permit authority.

Before a NPDES permit can be issued, the proposed permit must be published in a 30 day public notice. The public notice is a vehicle for informing all interested parties of the contents of a draft permit and other significant actions. The intent of the public notice is to provide an opportunity for the public to comment on the proposed permit.

If you are interested in receiving a copy of NPDES public notices, you may submit a written request to Leah Krafft, Wyoming Department of Environmental Quality, Water Quality Division, 122 West 25th Street, Cheyenne, WY 82002.

XVII) Resources

River Network: http://www.rivernetwork.org/index.cfm

State-by-State Clean Water Act: http://www.rivernetwork.org/cleanwater/cwa_search.asp

National Water Quality Control Council (NWQCC); data comparability and collaboration: http://wi.water.usgs.gov/pmethods/mdcbfs.pdf

NWQCC minimum list of metadata elements: http://wi.water.usgs.gov/pmethods/elements/list.htm

Wyoming WQ Monitoring Annual Workplan: 2003 http://deq.state.wy.us/wqd/watershed/3-0507-doc.pdf

Wyoming Water Quality Control Division: http://deq.state.wy.us/wqd

Wyoming Surface Water Quality Standards: http://deq.state.wy.us/wqd/index.asp?pageid=52#Stand

Manual of SOPs for Sample Collection and Analysis: http://deq.state.wy.us/wqd/watershed/10574-doc.pdf

WYDEQ Water Quality Division Five-Year Comprehensive Monitoring Plan, 2001 Update, October 2001: http://deq.state.wy.us/wqd/watershed/12806-doc.pdf

Jessup, B.K. and J.B. Stribling. 2000. *Testing the Wyoming stream integrity index*. Prepared by Tetra Tech, Inc., Owings Mills, Maryland, for USEPA Region 8, Denver, CO.

Gerritsen, J; Jessup, B.K.; King, K.; Smith, J. and Stribling, J.B. 2000. *Development of Biological Criteria for Wyoming Streams and their Use in the TMDL Process.* Prepared by Tetra Tech, Inc., Owings Mills, Maryland, for USEPA Region 8, Denver, CO.

Data can be found online at http://wy.water.usgs.gov/ and http://www.wrds.uwyo.edu/

For a copy of the *National Water Quality Inventory:2000 Report* (EPA-841-R-02-001), visit *www.epa.gov/305b/2000report/alhi.pdf* or call the EPA's National Service Center for Environmental Publications at 1-800-490-9198

EPA National TMDL home page: This site provides an overview of the national TMDL program with links to pertinent information on state programs. It includes information on TMDL laws and regulations, policies, documents, examples of TMDLs, and more. www.epa.gov/owow/tmdl

EPA Region 8 TMDL program: This site provides specific information on TMDL programs in EPA Region 8 (Montana, Wyoming, North Dakota, South Dakota, Colorado, and Utah). www.epa.gov/Region8/water/tmdl/index.html

Adopt Your Watershed: Learn about organizations active in your watershed! Over 4,000 watershed groups are listed. Also includes tools and resources to help new groups get started. Visit EPA's Adopt Your Watershed site at www.epa.gov/adopt/

Surf Your Watershed: This site provides multi-level water resource information. Enter your zip code and learn the facts about your watershed and ways you can get involved. Visit EPA's Surf Your Watershed site at www.epa.gov/surf

XVIII) Glossary

Acronyms

- BURP – Beneficial Use Reconnaissance Program
- CDs – Conservation Districts
- CWA – Clean Water Act
- EMAP – Environmental Monitoring and Assessment Program
- EPA – Environmental Protection Agency
- HUCs – Hydrologic Units
- NAWQA – National Water-Quality Assessment Program
- NPDES – National Pollutant Discharge Elimination System
- RSP – Reference Stream Project
- TMDL's – Total Maximum Daily Loads
- UAA – Use Attainability Analyses
- USGS – United States Geological Survey
- WACD – Wyoming Association of Conservation Districts
- WGFD – Wyoming Game and Fish Department
- WQD – Water Quality Division
- WYDEQ – Wyoming Department of Environmental Quality

Clean Water Act Words (Section 1)

Regular font definition found in state documents, *italic font definitions not directly found in state documents and thus might be different.*

- Acute Value – means the one hour average concentration. The EPA has determined that this value, if not exceeded more than once every three years on average, should not result in unacceptable effects on freshwater aquatic organisms and their uses. Acute values represent a response to a stimulus severe enough to induce a rapid reaction, typically in 96 hours or less. Appendix B contains acute values for certain pollutants.

- Chronic Value – means the four day average concentration. The EPA has determined that this value, if not exceeded more than once every three years on average, should not result in unacceptable effects on freshwater aquatic organisms and their uses. Chronic values represent a response to a continuous, long-term stimulus. Appendix B contains chronic values for certain pollutants.

- Ephemeral Stream Channels – means a stream which flows only in direct response to a single precipitation in the immediate watershed or in response to a single snow melt event, and which has a channel bottom that is always above the prevailing water table.

- Ground Water – means subsurface water that fills available openings in rock or soil materials such that they may be considered water saturated under hydrostatic pressure.

- Macroinvertebrate – *organisms that reside the majority of their life cycle on the bottom of running water ecosystems such as rivers. Some benthic taxa are also found in wetland and lake environments. These organism are excellent indicator species, they are easy and cheap to collect and are exposed to pollutants and environment in a variety of life cycles. Some states have biological macroinvertebrate criteria, but Colorado does not at this time.*

- Narrative Standards – *The suitable described condition of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control Commission. These are more difficult to enforce because they tend not to provide a clear threshold and can contain ambiguous terminology.*

- Nonpoint Source Discharges – means any source of pollution other than a point source. For purposes of W.S. 16-1-201 through 16-1-207 only, nonpoint source includes leaking underground storage tanks as defined by W.S. 35-11-1415(a)(ix) and aboveground storage tanks as defined by W.S. 35-11-1415(a)(xi).

- Numeric Standards – *The suitable limit (numeric level) of a specific parameter for protecting the classified use, which is assigned by the Water Quality Control Commission.*

- Point Source Discharges – means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding

operation or vessel or other floating craft, from which pollutants are or may be discharged

- Surface Water – means all perennial, intermittent and ephemeral defined drainages, lakes, reservoirs, and wetlands which are not man-made retention ponds used for the treatment of municipal, agricultural or industrial waste; and all other bodies of surface water, either public or private which are wholly or partially within the boundaries of the state. Nothing in this definition is intended to expand the scope of the Environmental Quality Act, as limited in W.S. 35-11-1104.

- Triennial Review Process – *Federal and Colorado Clean Water Act requires that criteria, designated uses and segmentation are reviewed for each major basin in a three year rotating cycle (hence triennial review).*

Antidegradation Policy for Wyoming CWA (Section 2)

- FERC – Federal Energy Regulatory Commission
- POTWs – Publicly Owned Treatment Works
- ONRWs – Outstanding National Resource Waters

Wyoming Wetlands (Section 3)

- FAC – Facultative Species
- FACW – Facultative Wetland
- OBL – Obligate Wetland

XIX) Appendices

Appendices A through H are referenced the throughout the previous chapters of this document. Sources of the information and the associated websites are listed in chapter XX.

Appendix A
Designated Uses

WHAT IS THE PROCESS AND CRITERIA FOR DETERMINING THE WATER QUALITY CONDITION OF SURFACE WATERS OF THE STATE?

Credible Data

State Law, enrolled Act #47, requires that only credible data be used in making water quality condition determinations. Credible data means scientifically valid chemical, physical and biological monitoring data collected under an accepted sampling and analysis plan including quality control, quality assurance procedures and available historical data. Included with credible data to help characterize the integrity of the water body will be considerations of soil, geology, hydrology, geomorphology, climate, steam succession and the influences of man upon the system.

Data must be collected using accepted referenced laboratory and field methods employed by a person who has received specialized training and has field experience in performing such methods or is under the supervision of a person who has these qualifications.

In those instances where numerical standards are exceeded or on ephemeral and intermittent water bodies where chemical and biological sampling may not be practical or feasible, less than a complete suite of data (chemical, physical, biological) may be used to make a decision on attainment of water quality standards or designated uses.

Where water quality standards are expressed in narrative terms, credible data will include information that documents the water as not being "free from" a pollutant that impacts the expressed designated use protected by the standard. All three categories of water quality measurement: chemical, physical, and biological need not show an exceedence in order to call a waterbody impaired. If any one of the three has an element that exceeds a standard the waterbody could be listed as impaired after reviewing weight-of-evidence of other relevant data.

Surface Water Classification Determination (Use designation) Chapter 1, Section 3, Wyoming Surface Water Quality Standards, states that the objectives of the Wyoming pollution control program are specifically designed *to provide, wherever attainable, the highest possible water quality commensurate with the following uses:* agriculture, fisheries, industry, drinking water, recreation, scenic value, aquatic life other that fish, wildlife, and fish consumption.

Four major surface water classes consisting of nine unique uses are described in Chapter 1, Water Quality Rules and Regulations, July 2001. A list of waterbodies and their classification is posted in Table A and Table B of "Wyoming Surface Water Classification List".

The water classes are a hierarchical categorization of waters according to existing and designated uses. Except for Class 1 waters, each classification is protected for its specified uses plus all the uses contained in each lower classification. Class 1 designations are based on value determinations rather than use support and are protected

for all uses in existence at the time or after designation. The Classifications and their subcategories are:

(a) Class 1, Outstanding Waters. Class 1 waters are those surface waters in which no further water quality degradation by point source discharges other than from dams will be allowed. In designating Class 1 waters, water quality, aesthetic, scenic, recreational, ecological, agricultural, botanical, zoological, municipal, industrial, historical, geological, cultural, archaeological, fish and wildlife, the presence of significant quantities of developable water and other values of present and future benefit to the people are considered.

(b) Class 2, Fisheries and Drinking Water. Class 2 waters are waters, other than those designated as Class 1, that are known to support fish or drinking water supplies or where those uses are attainable. Class 2 waters may be perennial, intermittent or ephemeral and are protected for the uses indicated in each sub category listed below. There are four subcategories of Class 2 waters.

(i) Class 2AB. Class 2AB waters are those known to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where a game fishery and drinking water use is otherwise attainable. Unless it is shown otherwise, these waters are presumed to have sufficient water quality and quantity to support drinking water supplies and are protected for that use.

(ii) Class 2A. Class 2A waters are those that are not known nor have the potential to support game fish but are used for public or domestic drinking water supplies, including their perennial tributaries and adjacent wetlands.

(iii) Class 2B. Class 2B waters are those known to support or have the potential to support game fish populations or spawning and nursery areas at least seasonally and all their perennial tributaries and adjacent wetlands and where it has been shown that drinking water uses are not attainable.

(iv) Class 2C. Class 2C waters are those known to support or have the potential to support only nongame fish populations or spawning and nursery areas at least seasonally including their perennial tributaries and adjacent wetlands.

(c) Class 3, Aquatic Life Other than Fish. Class 3 waters are waters, other than those designated as Class 1, that are intermittent, ephemeral or isolated waters and because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning, or certain perennial waters which lack the natural water quality to support fish (e.g., geothermal areas).

(i) Class 3A. Class 3A waters are isolated waters including wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable.

(ii) Class 3B. Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles.

(iii) Class 3C. Class 3C waters are perennial streams without the natural water quality potential to support fish or drinking water supplies but do support wetland characteristics. These may include geothermal waters and waters with naturally high concentrations of dissolved salts or metals or pH extremes.

(d) Class 4, Agriculture, Industry, Recreation and Wildlife. Class 4 waters are waters, other than those designated as Class 1, where it has been determined that aquatic life uses are not attainable pursuant to the provisions of Section 33 of these regulations.

(i) Class 4A. Class 4A waters are artificial canals and ditches that are not known to support fish populations.

(ii) Class 4B. Class 4B waters are intermittent and ephemeral stream channels that have been determined to lack the hydrologic potential to normally support and sustain aquatic life pursuant to the use attainability provisions of Section 33(b) of the Chapter 1 regulations.

(iii) Class 4C. Class 4C waters are all waters that have been determined to lack the potential to normally support and sustain aquatic life pursuant to the provisions of Section 33(b)(i), (iii), (iv), (v), and (vi) of Chapter 1 regulations.

Class 4 waters will be designated only after a Use Attainability analysis has been conducted since these waters are not protected for the uses specified in Section 101 (a)(2) of the federal Clean Water Act (e.g., fishable, swimmable, etc.).

A more complete explanation of the various classes can be found in Chapter 1, Wyoming Surface Water Quality Standards. See table 1 for a diagrammatic view of classification.

In general, Water Quality Rules and Regulations correlate designated uses to specific surface water classes. This correlation, along with reference to the specific regulations in Chapter 1, is presented in Table 2.

Use Support Determination

Assessment (weight-of-evidence).

Wyoming's use support determination for each appropriate designated use is based on the system found in Section 3, Volume 2, of the U.S. Environmental Protection Agency's

Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305 (b) Reports) and Annual Electronic Updates- Supplement. EPA-841-B-97-002B.

A determination of *attainment* or *nonattainment* is made for each designated use after the overall "support" has been determined. The degree of "support" of the designated use that is analyzed in order to determine attainment is as follows:

Attainment	-	Full Support (No impairment indicated by all data types).
Nonattainment	-	Fully Supporting but Threatened (No impairment indicated by all data types but with declining trend in water quality over time
	-	Partial Support (Impairment indicated by one or more data types).
	-	Nonsupport (Impairment indicated by all data types).

Determination of support (full or partial) will be achieved through the evaluation of credible data in a weight-of-evidence approach based on the specific water quality standards applicable to each designated use. When applying a weight-of-evidence approach, the department would not presumptively favor one type of data over another but would examine a collection of information and apply a relative "weight" or importance to each relevant part according to the specific circumstances.

The determination of the degree to which chemical, physical, and biological parameters meet water quality standards is contingent upon sampling the parameter for all hydrologic conditions. For example fecal coliform counts may be high during spring runoff and low during low flows in the winter. So time of year that the sample is taken can be very critical.

Those waterbodies that are determined as threatened, partially supporting or nonsupporting will be recommended for addition to the 303d list. [In the use support discussions that follow; the non listing /listing separator will be indicated by a line "_____" between the A and B delineation. All assessments that are above the line will cause the waterbody to not be listed as impaired and those below the line will cause the waterbody to be listed as impaired].

Chapter 1 of the Water Quality Rules and Regulations contain both numeric and narrative criteria for the protection of designated uses. Numeric criteria express acceptable values for chemical, physical, and biological parameters. Narrative criteria express acceptable water quality conditions for parameters that are not easily expressed as simple numeric values such as sediment, biological community structure, undesirable aquatic life etc.

For numeric standards to apply to determining impairment at least 10 percent of samples taken over a 3-year period must demonstrate an exceedence of a water quality standard.

If fewer than 10 samples are available in a five year period the department will use discretion and consider other factors such as the number of pollutants having a single exceedence and the magnitude of the exceedence(s) before making a judgment about impairment or not.

In reference to the standard for pathogens that requires a five sample in 30 days with at least a 24 hours period between samples and the calculation of a geometric mean, it has been the experience of DEQ that a one time sample that exceeds the standard by double will also exceed the standard when a geometric mean is determined. Therefore, a single sample that exceeds the standard by double or more will be sufficient to list a water as threatened.

Attainment of Aquatic Life Use.

Physical and Chemical data for each specific parameter with aquatic life use *numeric* water quality standards are analyzed to determine the degree of "support" of the beneficial use. Definitions of acute and chronic values (Chapter 1, Section 2 of the Water Quality Rules and Regulations) and Section 3.2.1 of the EPA guideline use the following support delineation for aquatic life:

A. Fully Supporting: For any one pollutant, no more than 1 exceedence (excluding historic data) of acute criteria (one hour concentration) within a 3-year period, based on grab or composite samples or no more than 1 exceedence of chronic (4-day average concentration) criteria (excluding historic data) within a 3-year period based on grab or composite samples.

B. Fully Supporting but Threatened: For any one pollutant, no more than 1 exceedence of acute or chronic criteria within a 3-year period as described above, with declining trend in water quality over time suggesting a condition of nonsupport may occur in the near future.

C. Partially Supporting: For any one pollutant, acute or chronic criteria exceeded more than once (excluding historic data) within a 3-year period, but in < 10 percent of samples.

D. Not Supporting: For any one pollutant, acute or chronic criteria exceeded in >10 percent of samples (excluding historic data).

Chemical, physical, and biological data that address aquatic life *narrative* water quality standards are used in a weight-of-evidence approach when determining use support.

1. Fully Supporting: Biological, Physical, and Chemical data (along with an analysis of Historical and ancillary data) indicate a functioning,

sustainable condition that is not modified beyond the natural range of reference condition.

2. Fully Supporting but Threatened: Biological, Physical, and Chemical data (along with an analysis of Historical and ancillary data) indicate a functioning condition that is not modified beyond the natural range of reference condition. However, one or more components indicate an apparent decline in ecological quality over time and ultimately could result in a partially supporting or non-supporting condition.

3. Partially Supporting: At least one component of the Biological, Physical, or Chemical data (with an analysis of historical and ancillary data) indicates modification to the aquatic community beyond the natural range of reference condition.

4. Not Supporting: All components of the Biological, Physical, and Chemical data (with an analysis of historical and ancillary data) indicates severe modifications beyond the natural range of reference conditions.

Table 3 provides a matrix for making aquatic life use support determinations when considering narrative water quality standards. The weight-of-evidence process requires the assessor (usually the person taking the sample) to evaluate each component of the assessment (biological, chemical, and physical) with respect to the strength of the data. For example: quantified data that have been validated and clearly show a departure from reference condition would exhibit a high weight toward the appropriate use support category. A qualitative data set that supports the quantitative data would add supplemental weight toward substantiating that use support decision. All data that substantiate the assessor's use support recommendation must be listed in order of strongest to weakest data. An important component in any weight-of-evidence examination is to bring forth all data that contradict the assessor's recommended use support determination. These are also listed in order of strongest to weakest data. If the listing of data contradicting the recommended use support determination is stronger than the data used to make that original determination, the assessor must reevaluate a decision to list.

Attainment of Agriculture Water Use.

Chapter 1, Section 20 of the Water Quality Rules and Regulations states *that all Wyoming surface waters which have the natural water quality potential for use as an agricultural water supply shall be maintained at a quality which allows continued use of such waters for agricultural purposes.* Agriculture is therefore a designated use for all four classes of water within the state. Degradation of such waters shall not be of such an extent to cause a measurable decrease in crop or livestock production.

A. Fully Support: No impairment indicated by all data types.

B. Fully Supporting but Threatened: No impairment indicated by all data types but a declining trend in water quality over time suggests a measurable decrease in crop or livestock production may occur if trends continue.

C. Partially Supporting: At least one pollutant demonstrated to cause a measurable decrease in crop or livestock production.

D. Not Supporting. More than one pollutant demonstrated to cause a measurable decrease in crop or livestock production.

The exact pollution threshold resulting in a measurable decrease in agricultural production is highly crop- and animal-dependent. After a demonstration of a measurable decrease in crop or livestock production has been made to the department, a surface water monitoring plan based on the specific crop or animal affected will be developed. Data from crop and livestock tolerance studies will be utilized to determine the pollutant(s) responsible and to set specific numeric limits.

Chapter 1 also provides several narrative standards to protect agricultural and other uses. Specific narrative standards consider are: Section 15. Settleable Solids; Section 16. Floating and Suspended Solids; Section 22. Radioactive Material; and Section 29. Oil and Grease.

Attainment of Fishery Use.

Chapter 1, Section 4(a) of the Water Quality Rules and Regulations include fish as a designated use of Class 1 waters. Section 4 (b) states that Class 2 waters support fisheries and drinking water.

Chapter 1, Section 3(b) of the Water Quality Rules and Regulations provide for the protection and propagation of fish. Protection and propagation are directly dependent on water chemistry, habitat quality, and other ecological factors such as the stability of the food chain.

The use of water quality data to evaluate attainment of fisheries designated use utilizes both numeric and narrative water quality standards.

Table 4 gives a partial breakdown of numeric standards found in Chapter 1 of the Water Quality Rules and Regulations for fisheries protection. This breakdown is for parameters commonly sampled for NPDES permits, bioassessment monitoring, and beneficial use reconnaissance monitoring. Additional numeric standards (chronic and acute values) can also be found in Chapter 1, Appendices B, C, and D. The determination of a water supporting or not supporting the fisheries designated uses can be made with these

numeric standards using the criteria outlined in the "Attainment of Aquatic Life Use - Numeric Water Quality Standards" section of this document.

Narrative standards concerning the protection of fisheries are also found in Chapter 1, Section 13. Toxic Materials; Section 15. Settleable Solids; Section 16. Floating and Suspended Solids; Section 22c. Radioactive Material; Section 25a. Temperature; Section 29. Oil and Grease; and Section. 32. Biological Criteria. Fish and other aquatic biota are also covered under the biological life narrative standard found in Chapter 1, Section 32. Table 5 outlines narrative water quality standards for the attainment of fish, wildlife, and aquatic life use.

As with aquatic life, a weight-of-evidence process will be utilized to determine the degree of use support for the fish designated use. The process described in the "Attainment of Aquatic Life -Narrative Water Quality Standards" and Table 3 of this document will be followed to determine support.

Attainment of Industrial Water Use

Chapter 1, Section 19 of the Water Quality Rules and Regulations states that *all Wyoming surface waters which have the natural water quality potential for use as an industrial water supply shall be maintained at a quality which allows continued use of such water for industrial purposes.* Industrial use is therefore a use supported by all four water classes in the state.

This section goes on to set the narrative standard for industrial waters as: *degradation of such waters shall not be of such an extent to cause a measurable increase in raw water treatment costs to the industrial user(s).* In order for the department to make the determination that waters have been degraded to the point of non-attainment of existing industrial use, specific water quality and raw water treatment cost data must be submitted by the industrial user. Those and any other pertinent engineering and economics data will then be reviewed by the department in order to make a finding.

A. Fully Supporting: No impairment indicated by all data types.

B. Fully Supporting but Threatened: No impairment indicated by all data types but declining trend in water quality over time suggests measurable increase in raw water treatment costs may occur if trends continue.

C. Partially Supporting: At least one pollutant demonstrated to cause a measurable increase in raw water treatment costs.

D. Not Supporting: More than one pollutant demonstrated to cause a measurable increase in raw water treatment costs.

Attainment of Drinking Water Use

Chapter 1, Section 18 of the Water Quality Rules and Regulations contains the standard relating to drinking water. The human health values listed in Appendix B of Chapter 1 shall not be exceeded in all Class 1 and 2 waters. Other numeric standards in: Sections 22. Radioactive Material; Section 23. Turbidity; and Section 26. pH; also apply.

Several narrative standards apply to drinking water uses. These include: Section 13. Toxic Materials; Section 14. Dead Animals and Solid Waste; Section 15. Settleable Solids; Section 16. Floating and Suspended Solids; and Section 17. Taste, Odor, and Color.

In order for the department to make the determination that waters do not support drinking water uses based on these narrative standards, specific water quality data must be reviewed in conjunction with human health advisories or human health research data found in the literature.

A. Fully Supporting: No impairment indicated by all data types.

B. Fully Supporting but Threatened: No impairment indicated by all data types but with declining trend in water quality over time.

C. Partially Supporting: At least one pollutant demonstrated to exceed a narrative water quality standard as it pertains to human consumption.

D. Not Supporting: More than one pollutant demonstrated to cause exceedences of one or more narrative standards as they pertain to human consumption.

Attainment of Recreation Water Use

Numeric standards that apply for determining attainment of recreation water use include: Section 22. Radioactive Material; and Section 26. pH; and Section 27. Fecal Coliform Bacteria.

Narrative Standards which apply to recreation water use are: Section 13. Toxic Materials; Section 14. Dead Animals and Solid Waste; Section 15. Settleable Solids; Section 16. Floating and Suspended Solids; Section 17. Taste, Odor, and Color;

Waters will be declared supporting recreation water use when numeric and narrative standards are achieved. Use support determinations are based on:

A. Fully Supporting: For fecal coliform bacteria, no exceedence in the past five-years of the 30-day, five sample geometric mean standard or the 24-hour, three sample geometric mean standard.

B. Fully Supporting but Threatened: For fecal coliform bacteria, individual samples exceed 400 colony forming units per 100 ml. and sampling was not sufficient to allow calculation of geometric mean values.

C. Partially Supporting: geometric mean of three separate samples collected within a 24 hours exceeds 400 colony forming units in a 100 ml sample.

D. Not Supporting: geometric mean of 5 samples obtained during separate 24 hour periods for any 30 day period exceeds 200 colony forming units in a 100 ml sample.

Attainment of Scenic Value Water Use

Scenic value water use covers all four classes of water in the state. The attainment of scenic value (aesthetic) water use is based on several narrative standards previously described under attainment of agriculture and human consumption uses. These include: Section 14. Dead Animals and Solid Waste; Section 15. Settleable Solids; and, Section 16. Floating and Suspended Solids; Section 17. Taste, Odor, and Color; and Section 28. Undesirable Aquatic Life.

A numeric standard that applies to scenic water use is found in Section 23. Turbidity.

In order to make a non-supporting determination for scenic value use, the physical and chemical nature of the waters must be documented by the department. This documentation could include photographs, water chemistry data, the physical presence of color-altered materials, citizen's complaints concerning unpalatable flavor in fish, and/or citizen's complaint's concerning undesirable taste, sight or odor to waters. Water chemistry data will be compared to literature sources documenting similar conditions.

A. Fully Supporting: No impairment indicated by all data types.

B. Fully Supporting but Threatened: No impairment indicated by all data types but with declining trend in water quality over time.

C. Partial Support: At least one pollutant demonstrated to cause an exceedence of a narrative water quality standard as it pertains to scenic value.

D. Not Supporting: More than one pollutant demonstrated to cause exceedence of one or more narrative water quality standards as they pertain to scenic value.

Attainment of Wildlife Water Use

Chapter 1, Sections 4(a); (b); (c); and (d) of the Water Quality Rules and Regulations include wildlife as designated use of Class 1, 2, 3, and 4 waters. Section 3 (h) states that the wildlife use includes protection of water quality to a level which is safe for contact and consumption by avian and terrestrial wildlife species.

There are no numeric criteria in Chapter 1 specific to wildlife protection. All numeric values relating to flora and fauna are specific to aquatic life.

Narrative standards concerning the protections of wildlife use are: Sections 13. Toxic Materials; Section 15. Settleable Solids; Section 16. Floating and Suspended Solids); Section 22. Radioactive Materials); and Section 29. Oil and Grease.

In order for the department to make the determination that waters do not support wildlife use based on these narrative standards, specific water quality data must be reviewed in conjunction with wildlife illness, death, or deformity information from wildlife agencies or wildlife health research data found in the literature.

A. Fully Supporting: No impairment indicated by all data types.

B. Fully Supporting but Threatened: No impairment indicated by all data types but with declining trend in water quality over time.

C. Partial Support: At least one pollutant demonstrated to cause an exceedence of a narrative water quality standard as it pertains to wildlife

D. Not Supporting: More than one pollutant demonstrated to cause exceedence of one or more narrative water quality standards as they pertain to wildlife.

Attainment of Fish Consumption Use

Chapter 1, Section 3 (i) of the Water Quality Rules and Regulations states that the fish consumption use involves maintaining a level of water quality that will prevent any unpalatable flavor and/or accumulation of harmful substances in fish tissue.

Numeric Water Quality Standards

In all Class 2AB, 2B and 2C waters, the human health values for "Fish Only" (consumption of aquatic organisms) shall not be exceeded. The determination of a water supporting or not supporting fish consumption designated use can be made using human health values for fish consumption in Appendix B or Chapter 1, Wyoming Water Quality Rules and Regulations.

Narrative standards concerning the protections of fish consumption use are found in Chapter 1, Section 17 (a) which states that no Class 1 or 2 waters shall contain substances attributable to the activities of man that would impart an unpalatable or off-flavor in fish flesh.
In order for the department to make the determination that waters do not support fish consumption use based on this narrative standard, specific water quality data must be reviewed in conjunction with citizen complaints and research data found in the literature.

A. Fully Supporting: No impairment indicated by all data types.

B. Fully Supporting but Threatened: No impairment indicated by all data types but with declining trend in water quality over time.

C. Partial Support: At least one pollutant demonstrated to cause an exceedence of the narrative water quality standard as it pertains to fish consumption.

D. Not Supporting: More than one pollutant demonstrated to cause exceedence of the narrative water quality standard as it pertains to fish consumption.

Table 1. Surface Water Classes and Uses

SURFACE WATER QUALITY CLASSES AND USES		
CLASS 1	OUTSTANDING WATERS	
CLASS 2	FISHERIES & DRINKING WATER	
	2AB	Supports game fish and drinking water
	2A	Does not support Game fish, supports drinking water
	2B	Supports game fish does not support drinking water
	2C	Supports non-game fish, does not support drinking water
CLASS 3	AQUATIC LIFE OTHER THAN FISH	
	3A	Isolated waters and wetlands not supporting fish or drinking water
	3B	Tributary waters including wetlands not supporting fish or drinking water
	3C	Perennial waters w/o natural quality to support fish or drinking water, but suppport wetlands
CLASS 4	AGRICULTURE, INDUSTRY, RECREATION, and WILDLIFE	
	4A	artificial canals/ditches not known to support fish
	4B	Non-perennial streams with infrequent wetlands or lacks hydrologic potential to support/sustain aquatic life
	4C	Lacks normal potential to support or sustain aquatic life (eg effluent dominated)

Table 2. Water Uses as Related to Specific Surface Water Classes

	Drinking water	Game Fish	Non-Game Fish	Fish Consumption	Other Aquatic Life	Recreation	Wildlife	Agriculture	Industry	Scenic Value
1*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	Yes	Yes	Yes	Yes	Yes
2AB	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2A	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
2B	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2C	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3A	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
3B	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
3C	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
4A	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
4B	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
4C	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes

* Class 1 waters are not protected for all uses in all circumstances. For example, all waters in the National Parks and Wilderness are Class 1, however, all do not support fisheries or other aquatic life uses (e.g. hot springs, ephemeral waters, wet meadows etc.). For stormwater permitting, 401 Certification, and WQ assessment purposes, the actual uses on each particular water must be determined independently.

Table 3. Aquatic Life Use Support, Narrative Water Quality Standards.

	FULL SUPPORT			PARTIAL SUPPORT	NON-SUPPORT
	Full Support	**Full Support**	**Threatened**		
Biological Data	Biological data do not deviate from the natural range of reference condition. Historical data do not show a decrease in biological condition that could lead to a condition of non-support.	Biological data deviate from the natural range of reference condition. Deviation can be explained by soils, geology, hydrology, climate, geomorphology, or stream succession and not the influences of man upon the system	Biological data deviates slightly from the natural range of reference condition. Any deviation observed is not explained by soils, geology, hydrology, climate, geomorphology, or stream succession. Data show a downward trend in biological condition that will lead to a condition of non-support in near future.	Biological data deviate from the natural range of reference condition. Deviation can not be explained by soils, geology, hydrology, climate, geomorphology, or stream succession. Biological condition of partial support verified by chemical, physical, or historical data.	Biological data deviate dramatically from the natural range of reference condition. Deviation can not be explained by soils, geology, hydrology, climate, geomorphology, or stream succession.
	And	**And**	**And/Or**	**And/Or**	**And/Or**
Chemical Data	Narrative water quality standards are achieved. Historical water quality data do not show seasonal or flow related trends that may not have been detected at the time of sampling.	Narrative water quality standards are not achieved. Failure to achieve standard is explained by soils, geology, hydrology, climate, geomorphology, or stream succession and not the influences of man upon the system.	Narrative water quality standards may be only be marginally achieved. Condition observed is not explained by soils, geology, hydrology, climate, geomorphology, or stream succession. Data show a downward trend in water quality condition that will lead to a condition of non-support in near future.	Narrative water quality standards not achieved. Condition observed is not explained by soils, geology, hydrology, climate, geomorphology, or stream succession. Water chemistry condition of partial support verified by biological, physical, or historical data.	Narrative water quality standards not achieved. Condition observed is not explained by soils, geology, hydrology, climate, geomorphology, or stream succession.
	And	**And**	**And/Or**	**And/Or**	**And/Or**
Physical (Habitat) Data	Narrative water quality standards are achieved.	Narrative water quality standards are not achieved. Failure to achieve standard is explained by soils, geology, hydrology, climate, geomorphology, or stream succession and not the influences of man upon the system..	Narrative water quality standards may be marginally achieved. Condition observed is not explained by soils, geology, hydrology, climate, geomorphology, or stream succession. Data show a downward trend in water quality condition that will lead to a condition of non-support in near future.	Narrative water quality standards not achieved. Condition observed is not explained by soils, geology, hydrology, climate, geomorphology, or stream succession. Physical (habitat) condition of partial support verified by biological, chemical, or historical data.	Narrative water quality standards not achieved. Condition observed is not explained by soils, geology, hydrology, climate, geomorphology, or stream succession.

Appendix B
Basic Standards and Treatment of Water Column

Table 4. Parameters for Making Use Support Determination for Fish and Aquatic Life Use.

PARAMETER	CATEGORY	CLASS	FULL ATTAIN-MENT	NON-ATTAINMENT	CITATION Chapter 1
Temperature	Cold water fisheries	1,2A,2B	≤1.1˚ C incr.	>1.1˚ C incr.	Sec. 25 (b)
			< 20˚ C	≥20˚ C	Sec. 25 (d)
	Warm water fisheries	1,2AB,2B,2C	≤2.2˚ C incr.	>2.2˚ C incr.	Sec. 25 (c)
			<30˚ C	≥30˚ C	Sec. 25 (d)
	Non game fisheries	2C	≤2.2˚ incr.	>2.2˚ C incr.	Sec. 25 (c)
	Spawning beds	1,2,	0 temp. incr.	>0 temp. incr.	Sec. 25 (f)
pH	All aquatic life	1,2,3,4	6.5 - 9.0	<6.5 or >9.0	Sec. 26
Turbidity	Cold water fisheries	1,2AB,,2B	≤10 NTU incr.	>10 NTU incr.	Sec. 23 (a)
	Warm water and nongame fisheries	1,2AB,2B,2C	≤15 NTU incr.	>15 NTU incr.	Sec. 23 (b)
Dissolved Oxygen	Cold water fisheries (early life stages)	1,2AB,2B	≥8.0 mg/L (1 day mini.)	<8 mg/L (1 day mini.)	Appendix D
	Cold water fisheries (other life stages)	1,2AB,2B	≥4.0 mg/L (1 day mini.)	<4.0 mg/L (1 day mini.)	Appendix D
Dissolved Oxygen	Warm water fisheries and aquatic life (early life stages)	2AB,2B,2C	≥5.0 mg/L (1 day mini.)	<5.0 mg/L (1 day mini.)	Appendix D
	Warm water fisheries and aquatic life (other life stages)	2AB,2B,2C	≥3.0 mg/L (1 day mini.)	<3.0 mg/L (1 day mini.)	Appendix D
Ammonia	Cold water fisheries and aquatic life	1,2	Temp & pH dependent (Appendix C)	Temp & pH dependent (Appendix C)	Sec. 21 (a)
Oil and Grease	Fish, wildlife, and aquatic life	1,2,3	≤ 10 mg/L	>10 mg/L	Sec. 29
Toxics	Fish & Aquatic	1,2,3	Varied	Varied	Appendix B

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Table 5. Narrative Standards for Making Use Support Determinations for Fish and Aquatic Life Use.

PARAMETER	CLASS	NARRATIVE STANDARD	METHODOLOGIES	CITATION
Radioactive Material	1,2	Not present in the water or sediments in amounts which could cause harmful accumulations in plant, wildlife, stock, or aquatic life.	Tissue analysis Literature review	Sec. 22 c
Settleable Solids	1,2	Not present in quantities which could result in significant degradation of habitat for aquatic life or adversely affect plant life or wildlife.	Streambed morphology Bioassessments Literature review	Sec. 15
Floating and Suspended Solids	1,2	Not be present in quantities which could result in significant degradation of habitat for aquatic life or adversely affect plant life or wildlife.	TSS sampling Bioassessments Literature review	Sec. 16
Oil and Grease	1,2	Not be present in amount which would cause the formation of a visible sheen or visible deposits on the bottom or shoreline; or cause damage or impairment of the normal growth, function or reproduction of human, animal, plant or aquatic life.	Ocular observation Streambed sampling Bioassessments Tissue sampling Literature review	Sec. 29
Toxic Materials	1,2	Other than those referenced in Sections 21 (e) and (f), toxic materials shall not be present in concentrations or combinations which constitute "pollution".	Bioassessments Tissue sampling Literature review	Sec. 13
Others	1,2	Pollutants not listed in Appendix B or C not exceed maximum allowable concentrations	Bioassessments Literature review	Sec. 21c
Temperature	1,2	No change in ambient temp. that is harmful	Monitoring	Sec 25a
Biologic	1,2	Free from man caused activities that affects biology	Monitoring	Sec. 32

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Appendix B
Water Quality Criteria [1]

PRIORITY POLLUTANTS

Pollutant	Aquatic Life Acute Value Micrograms/l	Aquatic Life Chronic Value Micrograms/l	Human Health Value Fish & Drinking Water[2] Micrograms/l	Human Health Value Fish Only[8] Micrograms/l
Acenaphthene			20[7]	2700
Acrolein			320	780
Acrylonitrile[3]			0.059	0.66
Benzene[3]			1.2	71
Benzidine[3]			0.00012	0.00054
Carbon tetrachloride[3] (Tetrachloromethane)			0.25	4.4
Chlorobenzene (Monochlorobenzene)			20[7]	21000
1,2,4 Trichlorobenzene			70[9]	940
Hexachlorobenzene[3]			0.00075	0.00077
1,2-Dichloroethane[3]			0.38	99
1,1,1-Trichloroethane			200[9]	
Hexachloroethane[3]			1.9	8.9
1,1,2-Trichloroethane[3]			0.60	42
1,1,2,2,-Tetrachloroethane[3]			0.17	11
Bis(2-chloroethyl) ether[3]			0.031	1.4
2-Chloronaphthalene			1700	4300
2,4,6-Trichlorophenol[3]			2.1	6.5
p-Chloro-m-cresol (4-Chloro-3-methylphenol)			3000[7]	
Chloroform (HM)[3] (Trichloromethane)			5.7	470
2-Chlorophenol			0.1[7]	400
1,2-dichlorobenzene			600[9]	17000
1,3-Dichlorobenzene			400	2600
1,4-Dichlorobenzene			75[9]	2600
3,3-Dichlorobenzidine[3]			0.04	0.077

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PRIORITY POLLUTANTS

Pollutant	Aquatic Life Acute Value Micrograms/l	Aquatic Life Chronic Value Micrograms/l	Human Health Value Fish & Drinking Water[2] Micrograms/l	Human Health Value Fish Only[8] Micrograms/l
1,1-Dichloroethylene[3]			0.057	3.2
1,2-trans-Dichloroethylene			100[9]	140000
2,4-Dichlorophenol			0.3[7]	790
1,2-Dichloropropane			0.52	39
1,3-Dichloropropylene (1,3-Dichloropropene) (cis and trans isomers)			10	1700
2,4-Dimethylphenol			400[7]	2300
2,4-Dinitrotoluene[3]			0.11	9.1
1,2-Diphenylhydrazine[3]			0.040	0.54
Ethylbenzene			700[9]	29000
Fluoranthene			300	370
Bis(2-chloroisopropyl) ether			1400	170000
Methylene chloride (HM)[3] (Dichloromethane)			4.7	1600
Methyl bromide (HM) (Bromomethane)			48	4000
Bromoform (HM)[6] (Tribromomethane)			4.3	360
Dichlorobromomethane (HM)[6]			0.56	46
Chlorodibromomethane (HM)[6]			0.41	34
Hexachlorobutadiene[3]			0.44	50
Hexachlorocyclopentadine			1[7]	17000
Isophorone[3]			36	2600
Nitrobenzene			17	1900
2,4-Dinitrophenol			70	14000
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)			13	765
N-Nitrosodimethylamine[3]			0.00069	8.1
N-Nitrosodiphenylamine[3]			5.0	16
N-Nitrosodi-n-propylamine[3]			0.005	1.4

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PRIORITY POLLUTANTS

Pollutant	Aquatic Life Acute Value Micrograms/l	Aquatic Life Chronic Value Micrograms/l	Human Health Value Fish & Drinking Water[2] Micrograms/l	Human Health Value Fish Only[8] Micrograms/l
Pentachlorophenol	19[5]	15[5]	0.28	8.2
Phenol			300[7]	4600000
Bis(2-ethylhexyl)phthalate[3]			1.8	5.9
Butyl benzyl phthalate			3000	5200
Di-n-butyl phthlate			2700	12000
Diethyl phthalate			23000	120000
Dimethyl phthalate			313000	2900000
Benzo(a)anthracene (PAH)[3] (1,2-Benzanthracene)			0.0044	0.049
Benzo(a)pyrene (PAH)[3] (3, 4-Benzopyrene)			0.0044	0.049
Benzo(b)fluoranthene (PAH)[3] (3,4-Benzofluoranthene)			0.0044	0.049
Benzo(k)fluoranthene (PAH)[3] (11,12-Benzofluoranthene)			0.0044	0.049
Chrysene (PAH)[3]			0.0044	0.049
Anthracene (PAH)[6]			9600	110000
Fluorene (PAH)[6]			1300	14000
Dibenzo(a,h)anthracene (PAH)[3] (1,2,5,6-Dibenzanthracene)			0.0044	0.049
Indeno(1,2,3-cd)pyrene (PAH)[3]			0.0044	0.049
Pyrene (PAH)[6]			960	11000
Tetrachloroethylene[3]			0.8	8.85
Toluene			1000[9]	200000
Trichloroethylene[3]			2.7	81
Vinyl chloride[3] (Chloroethylene)			2	525
Aldrin[3]	1.5		0.00013	0.00014
Dieldrin[3]	0.24	0.056	0.00014	0.00014
Chlordane[3]	1.2	0.0043	0.0021	0.0022
4,4'-DDT[3]	0.55	0.001	0.00059	0.00059

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PRIORITY POLLUTANTS

Pollutant	Aquatic Life Acute Value Micrograms/l	Aquatic Life Chronic Value Micrograms/l	Human Health Value Fish & Drinking Water[2] Micrograms/l	Human Health Value Fish Only[8] Micrograms/l
4,4'-DDE[3]			0.00059	0.00059
4,4'-DDD[3]			0.00083	0.00084
alpha-Endosulfan	0.11	0.056	110	240
beta-Endosulfan	0.11	0.056	110	240
Endosulfan sulfate			110	240
Endrin	0.086	0.036	0.76	0.81
Endrin aldehyde			0.76	0.81
Heptachlor[3]	0.26	0.0038	0.00021	0.00021
Heptachlor epoxide[3]	0.26	0.0038	0.0001	0.00011
alpha-BHC[3] (Hexachlorocyclohexane-alpha)			0.0039	0.013
beta-BHC[3] (Hexachlorocyclohexane-beta)			0.014	0.046
gamma-BHC (Lindane)[3] (Hexachlorocyclohexane-gamma)	0.95		0.019	0.063
PCB-1242 (Arochlor 1242)[3]		0.014	0.00017 [13]	0.00017 [13]
PBC-1254 (Arochlor 1254)[3]		0.014	0.00017 [13]	0.00017 [13]
PBC-1221 (Arochlor 1221)[3]		0.014	0.00017 [13]	0.00017 [13]
PBC-1232 (Arochlor 1232)[3]		0.014	0.00017 [13]	0.00017 [13]
PBC-1248 (Arochlor 1248)[3]		0.014	0.00017 [13]	0.00017 [13]
PBC-1260 (Arochlor 1260)[3]		0.014	0.00017 [13]	0.00017 [13]
PBC-1016 (Arochlor 1016)[3]		0.014	0.00017 [13]	0.00017 [13]
Toxaphene[3]	0.73	0.0002	0.00073	0.00075
Antimony			14	4300
Arsenic[3]	340	150	7	7
Asbestos[3]			7000000 fibers/l[9]	
Beryllium[3]			4[9]	
Cadmium	4.3[4]	2.2[4]	5[9]	
Chromium (III)	569.8[4]	74.1[4]	100[9] (total)	

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PRIORITY POLLUTANTS

Pollutant	Aquatic Life Acute Value Micrograms/l	Aquatic Life Chronic Value Micrograms/l	Human Health Value Fish & Drinking Water[2] Micrograms/l	Human Health Value Fish Only[8] Micrograms/l
Chromium (VI)	16	11	100[9] (total)	
Copper	13.4[4]	9[4]	1000[7]	
Cyanide (free)	22	5.2	200[9]	220000
Lead	64.6[4]	2.5[4]	15[9]	
Mercury	1.4	0.77	0.050	0.051
Nickel	468.2[4]	52.0[4]	100[9]	4600
Selenium	20	5[10]	50[9]	9000
Silver	3.4[4]			
Thallium			1.7	6.3
Zinc	117.2[4]	118.1[4]	5000[7]	69000
Dioxin (2,3,7,8-TCDD)[3]			0.000000013	0.000000014

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NON-PRIORITY POLLUTANTS

Pollutant	Aquatic Life Acute Value Micrograms/l	Aquatic Life Chronic Value Micrograms/l	Human Health Value Fish & Drinking Water[2] Micrograms/l	Human Health Value Fish Only[8] Micrograms/l
Alachlor[3]			2[9]	
Aluminum (pH 6.5-9.0 only)	750[10]	87 [10][14]		
Ammonia	See Appendix C			
Atrazine			3[9]	
Barium			2000[9]	
Bis(chloromethyl) Ether[3]			0.00013	0.00078
Carbofuran			40[9]	
Chloride	860000	230000		
Chlorine (total residual)	19	11		
Chlorophenoxy Herbicide 2,4,5,-TP			10	
Chlorpyrifos	0.083	0.041		
Chlorophenoxy Herbicide 2,4,-D			70[9]	
Dalapon			200[9]	
Demeton		0.1		
Di(2-ethylhexyl)adipate			400[9]	
Dibromochloropropane (DBCP)[3]			0.2[9]	
Dichloroethylene (cis-1,2-)			70[9]	
Dinoseb			7[9]	
Dinitrophenols			70	14000
Dissolved Gases		100% Sat.		
Dissolved Oxygen		See Appendix D		
Fecal Coliform			See Section 27	
Diquat			20[9]	
Endothall			100[9]	
Ether, Bis Chloromethyl			0.00013	0.00078
Ethylene dibromide (EDB)[3]			0.05[9]	
Fluoride			4000[9]	

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NON-PRIORITY POLLUTANTS

Pollutant	Aquatic Life Acute Value Micrograms/l	Aquatic Life Chronic Value Micrograms/l	Human Health Value Fish & Drinking Water[2] Micrograms/l	Human Health Value Fish Only[8] Micrograms/l
Glyphosate			700[9]	
Guthion		0.01		
Iron		1000[12]	300[11]	
Malathion		0.1		
Manganese	3110[4][12]	1462[4][12]	50[11]	
Methoxychlor		0.03	40[9]	
Mirex		0.001		
Nitrite (as N)			1000[9]	
Nitrates (as N)			10000[9]	
Nitrite+Nitrate (both as N)			10000[9]	
Nitrosamines			0.0008	1.24
Nitrosodidibutylamine,N			0.0064	0.587
Nitrosodiethylamine,N			0.0008	1.24
N-nitrosopyrrolidene[3]			0.016	91.9
Oxamyl (Vydate)			200[9]	
Parathion	0.065	0.013		
Pentachlorobenzene			3.5	4.1
pH		6.5-9.0		
Picloram			500[9]	
Simazine			4[9]	
Styrene			100[9]	
Sulfide-Hydrogen Sulfide (S^{2-}, HS^{-})		2		
1,2,4,5-tetrachlorobenzene			2.3	2.9
Tributyltin	0.46	0.063		
Trichlorfluoromethane			10000	860000
2,4,5-trichlorophenol			1.0[7]	9800
2,4,5-TP (2,4,5-trichlorophenoxy) propionic acid			50[9]	
Xylenes			10000[9]	

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(1) Except for the aquatic life values for metals and where otherwise indicated, the values given in this Appendix refer to the total recoverable (dissolved plus suspended) amount of each substance. For the aquatic life values for metals, the values refer to dissolved amount.

(2) Except where otherwise indicated, these values are based on EPA Section 304(a) criteria recommendations assuming consumption of 2 liters of water and 6.5 grams of aquatic organisms per day.

(3) Substance classified as a carcinogen with the value based on an incremental risk of one additional instance of cancer in one million persons.

(4) Hardness dependent criteria. Value given is an example only and is based on a $CaC0_3$ hardness of 100 mg/l. Criteria for each case must be calculated using the formula in Appendix F.

(5) pH dependent criteria. Value given is an example only and is based on a pH of 7.8. Criteria for each case must be calculated using the formula in Appendix G.

(6) Chemicals which are not individually classified as carcinogens but which are contained within a class of chemicals with carcinogenicity as the basis for the criteria derivation for that class of chemicals; an individual carcinogenicity assessment for these chemicals is pending.

(7) Value is based on organoleptic (taste and odor) effects and is more stringent than if based solely on toxic or carcinogenic effects.

(8) EPA Section 304(a) human health criteria recommendation assuming consumption of contaminated aquatic organisms at a rate of 6.5 grams per day.

(9) The criterion is based on an EPA drinking water standard (Maximum Contaminant Level or MCL).

(10) This value is expressed in terms of total recoverable metal in the water column.

(11) The iron and manganese criteria are based on Safe Drinking Water Act secondary standards and are intended to prevent undesirable aesthetic effects. These values represent the dissolved amount of each substance rather than the total amount.

(12) Value is based on the dissolved amount which is the amount that will pass through a 0.45 • m membrane filter prior to acidification to pH 1.5-2.0 with nitric acid.

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(13) This criterion applies to total PCBs, i.e., the sum of all congener or all isomer analyses.

(14) The aluminum criteria are expressed as total recoverable metal in the water column. The 87 µg/l chronic criterion for aluminum is based on information showing chronic effects on brook trout and striped bass. The studies underlying the 87 µg/l chronic value, however, were conducted at low pH (6.5 - 6.6) and low hardness (< 10 ppm $CaCO_3$), conditions uncommon in Wyoming surface waters. A water effect ratio toxicity study in West Virginia indicated that aluminum is substantially less toxic at higher pH and hardness (although the relationship is not well quantified at this time). Further, EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 87 µg/l aluminum when either the total recoverable or dissolved aluminum is measured. Based on this information and considering the available toxicological information in Tables 1 and 2 of EPA's Aluminum Criteria Document (EPA 440/5-86-008), the Department of Environmental Quality will implement the 87 µg/l chronic criterion for aluminum as follows: where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as $CaCO_3$ in the receiving water after mixing, the 87 µg/l chronic criterion will not apply, and aluminum will be regulated based on compliance with the 750 µg/l acute aluminum criterion. In situations where the 87 µg/l chronic criterion applies, a discharger may request development of and provide the basis for a site-specific chronic criterion based on a water-effect ratio. Or, a discharger may request development of and provide the basis for a permitting procedure (a translator) that would take into account less toxic forms of particulate aluminum.

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SITE-SPECIFIC CRITERIA

The criterion in this section is applicable only to the waters and/or locations specified and replaces similar criteria expressed elsewhere in these regulations.

Belle Fourche Drainage

The numeric human health criteria for iron and manganese shall not apply to Class 2 waters in the Belle Fourche River Drainage above the confluence of Donkey Creek and the main stem of the Belle Fourche River (including Donkey Creek);

The numeric human health criteria for iron and manganese shall not apply to main stem of the Belle Fourche River below the confluence of Donkey Creek.

Cheyenne River Drainage

The numeric human health criteria for iron and manganese shall not apply to Antelope Creek and all of its Class 2 tributaries;

The numeric human health criteria for iron and manganese shall not apply to Little Thunder Creek and all of its Class 2 tributaries below the confluence of North Prong.

Little Powder River Drainage

The numeric human health criteria for iron and manganese shall not apply to Class 2 waters in the Little Powder River Drainage.

Powder River Drainage

The numeric human health criteria for iron and manganese shall not apply to Class 2 waters in the Powder River Drainage except on the following waters:

The main stem of Clear Creek and its Class 2 tributaries upstream of Clearmont, Wyoming;

The main stem of Crazy Woman Creek and its Class 2 tributaries;

The North Fork of the Powder River and all its Class 2 tributaries;

and

The Middle Fork of the Powder River and all its Class 2 tributaries.

Appendix C
Stream and Waterbody Segmentation / Classification

The Wyoming Surface Water Classification list is divided into two parts, Table A and Table B. The listings in Table A are referred to as the *PRIMARY CLASSIFICATIONS* which take precedence over the listings in Table B. The water classifications contained in this document are based upon the provisions of Chapter 1 of the Wyoming Water Quality Rules and Regulations - Surface Water Standards, specifically Sections 4, 33, 34, 35 and Appendix A.

TABLE A - PRIMARY CLASSIFICATIONS

The waters listed in Table A are those that are either named on the USGS 1:500,000 scale hydrologic map of Wyoming or have been specifically classified by the Wyoming DEQ, Water Quality Division. The waters in Table A are organized by river basin in a downstream to upstream order. An indented entry is tributary to the previous entry.

TABLE B

The waters listed in Table B are those that are contained in the Wyoming Game & Fish Department's "Streams and Lakes Inventory" database as of June, 2000. The classifications shown for each of the waters in Table B are based on the presence or absence of fish species in that water. Most of the waters listed in Table A are also contained in Table B and in most cases the classifications are the same. There are circumstances, however, where the classifications may differ between the two tables. Where there is a difference in classification, Table A always takes precedence. Table B can only be used to determine the classification of waters that are not listed in Table A. Table B is organized alphabetically by water name. A G&F identification number included with each entry can be used as a cross-reference to the Game & Fish Department database for information on the specific fish species that serve as the basis for that classification.

DESIGNATED USES

The uses that are protected on Wyoming waters are listed and described in Section 3 of the Surface Water Quality Standards and include Agriculture, Fisheries, Aquatic Life other than Fish, Industry, Drinking Water, Fish Consumption, Recreation, Scenic Value and Wildlife. There are also numerous classifications for surface waters of the state. Except for Class 1, waters are classified according to their designated uses. Class 1 waters are specially designated waters on which the existing water quality is protected regardless of the uses supported by the water. The table that follows shows the uses designated on each of the use-based water classifications.

Table A - Wyoming Surface Water Classifications

The water classifications contained in this document are based upon the provisions of Chapter 1 of the Wyoming Water Quality Rules and Regulations - Surface Water Standards, specifically Sections 4, 33, 34, 35 and Appendix A.

ALL SURFACE WATERS IN WYOMING ARE CLASSIFIED AS FOLLOWS:

A. Class 1 Waters. The following waters are designated Class 1:

1. All surface waters located within the boundaries of national parks and congressionally designated wilderness areas as of January 1, 1999;

2. The main stem of the Snake River through its entire length above the U.S. Highway 22 Bridge (Wilson Bridge);

3. The main stem of the Green River, including the Green River Lakes from the mouth of the New Fork River upstream to the wilderness boundary;

4. The Main Stem of the Wind River from the Wedding of the Waters upstream to Boysen Dam;

5. The main stem of the North Platte River from the mouth of Sage Creek (approximately 15 stream miles downstream of Saratoga, Wyoming) upstream to the Colorado state line;

6. The main stem of the North Platte River from the headwaters of Pathfinder Reservoir upstream to Kortes Dam (Miracle Mile segment);

7. The main stem of the North Platte River from the Natrona County Road 309 bridge (Goose Egg bridge) upstream to Alcova Reservoir;

8. The main stem of Sand Creek above the U.S. Highway 14 bridge;

9. The main stem of the Middle Fork of the Powder River through its entire length above the mouth of Buffalo Creek;

10. The main stem of the Tongue River, the main stem of the North Fork of the Tongue River, and the main stem of the South Fork of the Tongue River above the U.S. Forest Service Boundary;

11. The main stem of the Sweetwater River above the mouth of Alkali Creek;

12. The main stem of the Encampment River from the northern U.S. Forest Service boundary upstream to the Colorado state line;

13. The main stem of the Clarks Fork River from the U.S. Forest Service boundary upstream to the Montana state line;

14. All waters within the Fish Creek (near Wilson, Wyoming) drainage;

15. The main stem of Granite Creek (tributary of the Hoback River) through its entire length;

16. Fremont Lake;

17. Wetlands adjacent to the above listed Class 1 waters.

B. **Classification Tables**. The tables that follow in this document contain a listing of individual water classifications for many of the larger waterbodies in each major river basin in the state. In addition to the listings contained herein, the following provisions apply:

1. **National Parks and Wilderness Areas.** All surface waters located within the boundaries of Yellowstone and Grand Teton National Parks and congressionally designated wilderness areas as of January 1, 1999 are Class 1 waters. Such Class 1 designation always takes precedence over the classification given in the listing. For example, Dinwoody Creek is shown as a Class 2 water; however, the upper portions are within a wilderness area and those portions are Class 1. The portion below the wilderness boundary is Class 2.

2. **Unlisted Waters.** The waters contained in the classification tables are all waters which are named on the USGS 1:500,000 hydrologic map of Wyoming and those otherwise classified by the Department. The classification list does not contain an exhaustive listing of all the surface waters in the state. Those waters which are not specifically listed are classified as follows:

(a) All waters shown as having any species of game fish present in the Wyoming Game and Fish Department's *Streams and Lakes Database*[1] as submitted to the Department of Environmental Quality in June,2000 are classified as 2AB;

(b) All waters shown as having only nongame fish species present in the Wyoming Game and Fish Department's *Streams and Lakes Database* as submitted to the Department of Environmental Quality in June,2000 are classified as 2C;

(c) All other waters shall be classified as follows:

(i) Those waters supported by an approved UAA containing defensible reasons for not protecting aquatic life uses shall be 4A, 4B or 4C;

(ii) The remaining waters shall be 3A, 3B or 3C.

(d) Wetlands. All adjacent wetlands shall have the same classification as the water to which they are adjacent.

Water Classifications

Waters are listed within each drainage as they proceed upstream. An indented entry is tributary to the previous entry. All Class 2AB and 2B waters are designated as cold water game fisheries unless identified with a "ww" notation. All Class 2C waters are designated as warmwater fisheries.

BEAR RIVER DRAINAGE

BEAR R 2AB					
WOODRUFF NARROWS RES 2AB					
	THOMAS FK 2AB				
		SOUTH FK 2AB			
	SMITHS FK 2AB				
	MUDDY CR 2AB				
		DRY FK 2AB			
		HOBBLE CR 2AB			
			COANTAG CR 2AB		
			LAKE CR 2AB		
				ALICE LK 2AB	
	SUBLETTE CR 2AB				
	TWIN CR 2AB				
		ROCK CR 2AB			
		NORTH FK 3B			
		CLEAR CR 3B			
		SOUTH FK 3B			
		EAST FK 3B			
	RAYMOND CR 2AB				
		BRIDGER CR 3B			
		WARNER SPRING 3B			
	TUNNEL DITCH 4A				
		WHITNEY CANYON CR 3B			
	NEEDLES CR 3B				
	CLEAR CR 3B				
		CHAPMAN DITCH 4A			
	YELLOW CR (BL UTAH STATE LINE) 2C				

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BEAR RIVER DRAINAGE

	YELLOW CR (AB UTAH ST ATE LINE) 2AB				
	SALT CR 2AB				
	PLEASANT VALLEY CR 3B				
		LONG HOLLOW CR 3B			
	SIMS CANYON CR 3B				
	SULPHUR CR 2AB				
	MILL CR 2AB				
		BAZOO HOLLOW 3B			
		HARMS DR 3B			
		LACHAPELLE CR 3B			

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Table B - Wyoming Fish Inventory Database

The water classifications provided for in Chapter 1 of the Wyoming Water Quality Rules and Regulations - Surface Water Standards rely to some extent on the Wyoming Game and Fish Department's Fish Inventory Database for water classification purposes. The primary use of the database is to determine the classification of waters that are not specifically listed in Table A of this document. The tables that follow contain information extracted from the Game & Fish Database as submitted to the Department of Environmental Quality in June, 2000. All of the waters that are recorded in the G&F database are represented in these tables along with the appropriate water quality classification.

How to interpret and use these tables for water quality classification purposes:

The water listings that follow *(Table B)* can only be used to determine the classification of waters that are **not listed** in Table A. Most of the waters listed in Table A can also be found in Table B and the classifications will usually be the same. However, there are circumstances where these tables will show a classification that differs from Table A. Wherever there is a difference or conflict between a classification in Table A and a classification shown in Table B, Table A takes precedence.

Class 1 Waters

Waters and water segments that are located in Grand Teton or Yellowstone National Parks or in Congressionally designated wilderness areas are Class 1 regardless of the classification shown in these tables. Waters outside of the National Parks and wilderness areas that have been designated as Class 1 in Appendix A are also shown as Class 1 in these tables. Additionally, a note has been added to each Class 1 listing in this table which describes the exact reach of the waterbody that is Class 1. These notes are referenced by number in the table and are explained below:

1 All surface waters located within the boundaries of national parks and congressionally designated wilderness areas as of January 1, 1999;

2 The main stem of the Snake River through its entire length above the U.S. Highway 22 Bridge (Wilson Bridge);

3 The main stem of the Green River, including the Green River Lakes from the mouth of the New Fork River upstream to the wilderness boundary;

4 The Main Stem of the Wind River from the Wedding of the Waters upstream to Boysen Dam;

5 The main stem of the North Platte River from the mouth of Sage Creek (approximately 15 stream miles downstream of Saratoga, Wyoming) upstream to the Colorado state line;

6 The main stem of the North Platte River from the headwaters of Pathfinder Reservoir upstream to Kortes Dam (Miracle Mile segment);

7 The main stem of the North Platte River from the Natrona County Road 309 bridge (Goose Egg bridge) upstream to Alcova Reservoir;

8 The main stem of Sand Creek above the U.S. Highway 14 bridge;

9 The main stem of the Middle Fork of the Powder River through its entire length above the mouth of Buffalo Creek;

10 The main stem of the Tongue River, the main stem of the North Fork of the Tongue River, and the main stem of the South Fork of the Tongue River above the U.S. Forest Service Boundary;

11 The main stem of the Sweetwater River above the mouth of Alkali Creek;

12 The main stem of the Encampment River from the northern U.S. Forest Service boundary upstream to the Colorado state line;

13 The main stem of the Clarks Fork River from the U.S. Forest Service boundary upstream to the Montana state line;

14 All waters within the Fish Creek (near Wilson, Wyoming) drainage;

15 The main stem of Granite Creek (tributary of the Hoback River) through its entire length;

16 Fremont Lake;

17 Wetlands adjacent to the above listed Class 1 waters.

WATER NAME	TRIBUTARY TO	COUNTY	TWP	RANGE	SEC	CLASS	NOTE	G&F ID
All waters or portions of waters that are located within Yellowstone or Grand Teton National Parks or congressionally designated wilderness areas as of January 1, 1999.						1		
14-MILE RESERVOIR	14-MILE CREEK	SWEETWATER	21	105	33	2C		GR540330SR
14TH TEE POND	FISH CREEK	TETON	41	117	11	1	14	JN510531TN
22 CREEK	CARTRIDGE CREEK	FREMONT	44	106	29	3B		LR926371FT
24 DRAW RESERVOIR	FENCE CREEK	SHERIDAN	58	77	24	3B		SN530015SN
2ND HONEYMOON CREEK	HONEYMOON LAKE	FREMONT	38	106	3	2AB		LR826273FT
3 WATER MOUNTAIN CR.	JAKEY'S FORK	FREMONT	40	107	31	3B		LR926785FT
3 WATER MTN. CR. II	JAKEY'S FORK	SUBLETTE	40	108	36	3B		LR926785SE
3 WATERS MTN CRK S1	JAKEYS FORK	FREMONT	40	107	30	3B		LR826785FT
3 WATERS MTN CRK S2	JAKEYS FORK	SUBLETTE	40	108	0	3B		LR826785SE
30 06 CREEK	CARTRIDGE CREEK	FREMONT	44	106	20	3B		LR826376FT
30 30 CREEK	CARTRIDGE CREEK	FREMONT	44	106	20	3B		LR826373FT
40 ROD POND		SUBLETTE	0	0	0	3A		PE540907SE
41 RANCH RESERVOIR	N FK CRAZY WOMAN CREEK	JOHNSON	49	82	26	2AB		SN430191JN
5 MILE RESERVOIR 1	FIVE MILE CREEK	SHERIDAN	57	86	4	3B		SN030380SN
5 SISTERS LAKE #1	CUTTHROAT CREEK	SUBLETTE	37	108	35	3B		PE140808SE
5 SISTERS LAKE #2	CUTTHROAT CREEK	SUBLETTE	37	108	35	3B		PE140810SE
5 SISTERS LAKE #3	CUTTHROAT CREEK	SUBLETTE	37	108	35	3B		PE140809SE
5 SISTERS LAKE #4-DODGE	CUTTHROAT CREEK	SUBLETTE	37	108	35	3B		PE140807SE
5 SISTERS LAKE #5	CUTTHROAT CREEK	SUBLETTE	37	108	35	3B		PE140806SE
67 RESERVOIR	PINEY CREEK, NORTH	SUBLETTE	30	112	8	2AB		PE440914SE
7 RANCH STOCK POND	CUMMINGS CREEK	JOHNSON	50	82	15	2AB		SN531215JN
71 RESERVOIR	DEER CREEK	FREMONT	36	90	20	2AB		LR520058FT
76 RESERVOIR 2	M FK CRAZY WOMAN CREEK	JOHNSON	47	82	19	2AB		SN430175JN
85 CREEK	LITTLE POWDER RIVER	CAMPBELL	57	71	24	3B		SN937060CL
9TH PARALLEL RES	SPRING CREEK	SUBLETTE	36	111	4	3B		PE240760SE
A & M RESERVOIR	OSBORNE DRAW	SWEETWATER	26	91	9	2AB		LR450028SR

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WATER NAME	TRIBUTARY TO	COUNTY	TWP	RANGE	SEC	CLASS	NOTE	G&F ID
A BAR A CREEK	BIG CREEK		14	81	20	3B		LE857020
A. W. DAVIS STOCK POND	SOUTH CROW CREEK	ALBANY	13	71	2	2AB		LE560100AY
A2Z RANCH PONDS	SHOSHONE R, SF>FALL CR	PARK	49	106	25	3B		CY520518PK
AAGARD RESERVOIR	GREYBULL R, >WOOD R CON	BIG HORN	51	96	2	3B		CY720835BN
ABANDONED CREEK	BADWATER CREEK	NATRONA	40	87	30	3B		LR925256NA
ABES POND	PINEY CREEK	SHERIDAN	53	83	21	2AB		SN530152SN
ABLE CREEK	LOST SOLDIER CREEK	FREMONT	27	90	34	2AB		LR857965FT
ABLE CREEK	LOST SOLDIER CREEK	SWEETWATER	27	90	34	3B		LR957965SR
ABOSKO LAKE	FISH CREEK, SOUTH FORK	SUBLETTE	40	108	16	2AB		JN110009SE
ABRUPT CREEK	WIGGINS FORK	FREMONT	45	106	25	3B		LR926442FT
AC 166 HART MT DRAIN D	ALKALI CREEK	PARK	55	101	10	2B		CY821167PK
AC 200 HART MT DRAIN 5	ALKALI CREEK	PARK	55	101	10	2B		CY821165PK
AC 293 HART MT DRAIN 4	ALKALI CREEK	PARK	55	101	13	2B		CY821164PK
AC 334 HART MT DRAIN 3	ALKALI CREEK	PARK	55	100	17	2B		CY821163PK
AC 496 HART MT DRAIN 2	ALKALI CREEK	PARK	55	100	22	2B		CY821162PK
AC 540 HART MT DRAIN 1	ALKALI CREEK	PARK	55	100	22	2B		CY821161PK
ACE LAKE	MUDDY CREEK	PARK	58	106	24	2AB		CY180575PK
ACKERMAN DICK RESERVOIR	LITTLE MISSOURI RIVER	CROOK	56	65	6	3B		SN060041CK
ADA, LAKE	FALL CREEK	SUBLETTE	34	107	20	3B		PE140492SE
ADAMS CANYON CREEK	MOSQUITO CREEK	TETON	40	117	7	2AB		JN814190TN
ADAMS CREEK	BIG SAGE CREEK	CARBON	17	87	19	2C		LE856237CN
ADAMS CREEK	WILLOW CREEK	LINCOLN	38	115	29	2AB		JN813390LN
ADAMS PASS CREEK	RANGER CREEK	FREMONT	33	102	7	3B		LR825657FT
ADAMS RES 1	SAGE CREEK	CARBON	17	87	19	2AB		LE450499CN
ADAMS RES 2	SAGE CREEK	CARBON	17	87	19	2AB		LE450501CN
ADAMS RESERVOIR	SAGE CREEK	WASHAKIE	46	92	6	2AB		CY620510WE
ADDISON FISH POND	MIDDLE SYBILLE CREEK	ALBANY	21	71	23	2AB		LE550103AY
ADELAIDE CREEK	SHELL CR, <BEAVER CR	BIG HORN	53	88	27	2AB		CY822295BN

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Appendix D
Treatment of Sediment
(not available)

Appendix E
Treatment of Biological (#12)

WYOMING

Contact Information

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Program Description

The primary objective of bioassessments conducted by the Wyoming Department of Environmental Quality (WYDEQ) is to assess the support of aquatic life for 303(d) listing and 305(b) reporting, using macroinvertebrates as the primary indicator. The program has been in existence since 1993, when it was initiated in the form of the Reference Stream Project (RSP). The primary goal of the RSP was to collect baseline biological data at least-impacted (reference) streams in each ecoregion of Wyoming as a benchmark for assessing biological and water quality conditions of other streams across the State. In 1998, the focus shifted from collecting reference stream data to using RSP data as a benchmark to assess biological conditions of other Wyoming streams as part of the Beneficial Use Reconnaissance Program (BURP). BURP uses a comprehensive approach (chemical, physical, and biological components) to assess water quality conditions of Wyoming streams. Today, the RSP is still ongoing, but at a much smaller scale.

Several other organizations have been or will be important sources of bioassessment data in Wyoming. The Wyoming Association of Conservation Districts (WACD) has been very involved in collecting biological data at streams across Wyoming. With proper guidance, local Conservation Districts (CDs) can elect to assume some of WYDEQ's bioassessment responsibilities, with the data being used for 303(d) and 305(b). Many CDs have welcomed the opportunity to collect bioassessment data.

The USGS also has been a very important source of biological data. Wyoming has contracted the USGS-Wyoming District to carry out the Environmental Monitoring and Assessment Program (EMAP) monitoring in Wyoming. Approximately 50 randomly selected sites will be assessed over the four year contract, with the end goal being an unbiased estimate of water quality conditions in the State. The USGS also conducted an assessment of the Yellowstone River Basin of Wyoming and Montana as part of the National Water-Quality Assessment Program (NAWQA). The considerable amount of biological data generated from these studies is being evaluated for comparability with WYDEQ data to explore the usefulness of these data for 305(b) purposes. In addition, joint-funding agreements are in place with the USGS that allow for enhanced biological monitoring of streams in areas affected by coal bed methane development.

The Wyoming Game and Fish Department (WGFD) is an important source of fish data. WYDEQ has chosen not to sample fish communities as part of bioassessments, but uses WGFD data for determining support of fisheries uses, as well as in classifying streams for assignment of uses and designating appropriate water quality standards associated with those uses.

Wyoming has made significant strides in recent years in the development of multimetric biocriteria. Work will continue toward refining the existing numeric criteria and narrative aquatic life standard, and toward the eventual implementation of numeric aquatic life standards. Implementation of numeric standards is sure to be a challenging effort. The physical heterogeneity of Wyoming (e.g., climate, landscape, land use, and geology) poses significant scientific challenges. Political considerations are also likely to pose challenges.

Currently, WY is exploring the use of predictive models for assessing biological conditions of streams, as well as the addition of periphyton as an additional biological indicator to supplement macroinvertebrate data and WGFD fish data used in bioassessments. Periphyton samples have been collected at a limited number of long-term reference stations in the past, and the use of periphyton data will expand in coming years.

Documentation and Further Information

Wyoming's 2000 305(b) State Water Quality Assessment Report and *2000 303(d) Report*: http://deq.state.wy.us/wqd/watershed/01452-doc.pdf

Wyoming Surface Water Quality Standards: http://deq.state.wy.us/wqd/index.asp?pageid=52#Stand

Manual of SOPs for Sample Collection and Analysis: http://deq.state.wy.us/wqd/watershed/10574-doc.pdf

WYDEQ Water Quality Division Five-Year Comprehensive Monitoring Plan, 2001 Update, October 2001: http://deq.state.wy.us/wqd/watershed/12806-doc.pdf

Jessup, B.K. and J.B. Stribling. 2000. *Testing the Wyoming stream integrity index*. Prepared by Tetra Tech, Inc., Owings Mills, Maryland, for USEPA Region 8, Denver, CO.

Gerritsen, J; Jessup, B.K.; King, K.; Smith, J. and Stribling, J.B. 2000. *Development of Biological Criteria for Wyoming Streams and their Use in the TMDL Process*. Prepared by Tetra Tech, Inc., Owings Mills, Maryland, for USEPA Region 8, Denver, CO.

Data can be found online at http://wy.water.usgs.gov/ and http://www.wrds.uwyo.edu/

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WYOMING

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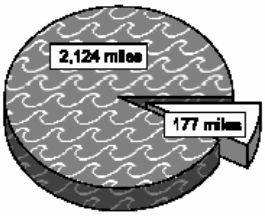
Programmatic Elements

Uses of bioassessment within overall water quality program	✓	problem identification (screening)
	✓	nonpoint source assessments
	✓	monitoring the effectiveness of BMPs
	✓	ALU determinations/ambient monitoring
		promulgated into state water quality standards as biocriteria
	✓	support of antidegradation
	✓	evaluation of discharge permit conditions
	✓	TMDL assessment and monitoring
	✓	other: UAAs and site-specific standards
Applicable monitoring designs	✓	targeted (i.e., sites selected for specific purpose) *(specific river basins or watersheds)*
	✓	fixed station (i.e., water quality monitoring stations) *(specific river basins or watersheds)*
		probabilistic by stream order/catchment area
		probabilistic by ecoregion, or statewide
	✓	rotating basin *(specific river basins or watersheds)*
		other:

Stream Miles

Total miles *(determined using RF3, 2000 and National Hydrography Datatbase, 2001)*	**113,422**
Total perennial miles	32,520
Total miles assessed for biology*	**2,639**
fully supporting for 305(b)	2,124
partially/non-supporting for 305(b)	177
listed for 303(d)	177
extent fully supporting, but threatened	388
number of sites sampled	700+
number of miles assessed per site	3.25

2,639 Miles Assessed for Biology



*Since a Weight-of-Evidence approach is used in use support decisions, the numbers provided reflect waterbody reach extent where some type of biological data were used in the assessment.

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Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Class System (A,B,C), Fishery Based Uses and Warm Water vs. Cold Water	
ALU designations in state water quality standards	Game Fish (Warm Water and Cold Water Game Fish), Non-game Fish and Aquatic Life Other than Fish	
Narrative Biocriteria in WQS	Formal/informal numeric procedures exist to support ALU decisions.	
Numeric Biocriteria in WQS	under development (Numeric biocriteria are in use but are still being refined and are not yet incorporated in WY's water quality standards.)	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	✓	assessment of aquatic resources
	✓	cause and effect determinations
		permitted discharges
	✓	monitoring (e.g., improvements after mitigation)
	✓	watershed based management
Uses of bioassessment/ biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	Trend analysis in watershed improvement projects and following degradation resulting from construction projects and spills.	

Reference Site/Condition Development

Number of reference sites	**140** based on field investigation checklist **90** based on quantitative physical and chemical filters	
Reference site determinations		site-specific
		paired watersheds
	✓	regional (aggregate of sites)
	✓	professional judgment *(Best Professional Judgment based on landscape and field investigation coupled with select water chemical and physical filters)*
		other:
Reference site criteria	Site is identified by the field investigation to be "reference quality" based on analysis of a 27 item checklist of reach and watershed characteristics plus select ecoregion specific quantitative physical and chemical filters.	
Characterization of reference sites within a regional context		historical conditions
	✓	least disturbed sites
		gradient response
	✓	professional judgment
		other:
Stream stratification within regional reference conditions	✓	ecoregions (or some aggregate)
		elevation
		stream type
		multivariate grouping
		jurisdictional (i.e., statewide)
		other:
Additional information		reference sites linked to ALU
		reference sites/condition referenced in water quality standards
	✓	some reference sites represent acceptable human-induced conditions

DRAFT

Revisions December 2002

Field and Lab Methods

Assemblages assessed	✓	benthos *(100-500 samples/year; single season, multiple sites – not at watershed level)*
		fish
	UD	periphyton
		other:
Benthos		
sampling gear		Surber, dipnet; 500-600 micron mesh
habitat selection		riffle/run (cobble)
subsample size		500 count
taxonomy		combination--genus, species
Periphyton		
sampling gear		**natural substrate:** brushing/scraping device (razor, toothbrush, etc.)
habitat selection		riffle/run (cobble)
sample processing		WYDEQ's periphyton program is under development. Samples have been collected, but analysis protocols are yet to be developed.
taxonomy		under development
Habitat assessments		visual based, quantitative measurements, hydrogeomorphology, pebble counts (Wolman), streambank stability (Bauer and Burton - EPA910/R-93-017), pool quality (Bauer and Burton); performed with bioassessments
Quality assurance program elements		standard operating procedures, quality assurance plan, periodic meetings and training for biologists, taxonomic proficiency checks, specimen archival

Data Analysis and Interpretation

Data analysis tools and methods	✓	summary tables, illustrative graphs
		parametric ANOVAs
	UD	multivariate analysis
	✓	biological metrics *(aggregate metrics into an index)*
		disturbance gradients
		other:
Multimetric thresholds		
transforming metrics into unitless scores		95th percentile of reference population
defining impairment in a multimetric index		25th percentile of reference population
Evaluation of performance characteristics	✓	repeat sampling *(select sites are sampled annually to document annual variability)*
	✓	precision *(side-by-side sampling at 10% of stations; Data Quality Objectives for density and number of taxa)*
		sensitivity
		bias
		accuracy
Biological data		
Storage		STORET, EDAS, and internal spreadsheets
Retrieval and analysis		EDAS

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Appendix F
Naming Conventions
(not available)

Appendix G
303(d) example

Table A: 2004 303(d) Waterbodies with Water Quality Impairments

Basin	HUC	Name	Class	Location	Cause of Impairment	Sources	Data Sources	Uses Impaired	Date Listed	Priority
BF	10120201	BELLE FOURCHE RIVER	2ABWW	Exceedences measured between Arch Ck and Hulett.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L
BF	10120201	BELLE FOURCHE RIVER	2ABWW	From Keyhole Reservoir upstream an undetermined distance above Rush Ck.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	1996	L
BF	10120201	DONKEY CREEK	3B	From confluence with Belle Fourche R upstream to Stonepile Ck.	Fecal Coliform	Point, Undeterm.	DEQ	Contact Recreation	2000	L
BF	10120201	GILLETTE FISHING LAKE	2AB	Gillette Fishing Lake.	Phosphate	Non-point	Intermountain CD	Warm Fish, Aquatic Life	1996	L
BF	10120201	GILLETTE FISHING LAKE	2AB	Gillette Fishing Lake.	Siltation	Non-point	Intermountain CD	Warm Fish, Aquatic Life	1996	L
BR	16010101	BEAR RIVER	2AB	From Woodruff Narrows Res up to Sulphur Ck.	Sediment	Undeterm.	DEQ	Aquatic Life	2002	L
BH	10080003	MIDDLE FORK POPO AGIE RIVER	2AB	Undetermined distances upstream and downstream of City of Lander.	Fecal Coliform	Point Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080007	BIG HORN RIVER	2AB	From Greybull R upstream to Nowood R.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2000	L
BH	10080007	COTTONWOOD CREEK	2AB	From Bighorn River up to Hamilton Dome Oil Field.	Chloride	Point	Merit Energy, DEQ	Cold Fish, Aquatic Life	2004	L
BH	10080007	COTTONWOOD CREEK	2AB	From Bighorn River up to Hamilton Dome Oil Field.	Selenium	Point	Merit Energy	Cold Fish, Aquatic Life, Wildlife	2004	L
BH	10080008	NOWOOD RIVER	2AB	From confluence with Bighorn R upstream an undetermined distance.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080009	GREYBULL RIVER	2AB	From confluence with Bighorn R upstream to the Highway bridge.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080010	BIG HORN RIVER	2AB	From Greybull R downstream undetermined distance above Big Horn Lake.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080010	GRANITE CREEK	2AB	From confluence with Shell Ck upstream approximately 4 miles to an undetermined point near Antelope Butte Ski Area.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L
BH	10080010	SHELL CREEK	2AB	From confluence with Bighorn R upstream an undetermined distance.	Fecal Coliform	Undeterm.	DEQ	Contact Recreation	2002	L

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Table D: Waterbodies Delisted from Wyoming's 2002 303(d) List

Basin	HUC	Name	Class	Location	Former Impairments/Threats	Listing Reason	Delisting Reason
BF	10120201	BELLE FOURCHE RIVER	2ABWW	Undetermined distance below Hulett WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020214 WLA Re-evaluation	EPA Approved TMDL
BF	10120201	RUSH CREEK	3B	Undetermined distance below Moorcroft WWTP	Ammonia, Fecal Coliform, Chlorine	WY0021741 WLA Re-evaluation	EPA Approved TMDL
BH	10080001	WIND RIVER	2AB	Undetermined distance below Riverton WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020672 WLA Re-evaluation	EPA Approved TMDL
BH	10080003	POPO AGIE RIVER	2AB	Undetermined distance below Hudson WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020664 WLA Re-evaluation	EPA Approved TMDL
BH	10080007	BIGHORN RIVER	2AB	Undetermined distance below Worland WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020176 WLA Re-evaluation	EPA Approved TMDL
BH	10080007	BIGHORN RIVER	2AB	Undetermined distance below Thermopolis WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020192 WLA Re-evaluation	EPA Approved TMDL
BH	10080010	BIGHORN RIVER	2AB	Undetermined distance below Greybull WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020583 WLA Re-evaluation	EPA Approved TMDL
BH	10080014	BITTER CREEK	2AB	Undetermined distance below Powell WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020648 WLA Re-evaluation	EPA Approved TMDL
BH	10080014	SHOSHONE RIVER	2AB	Undetermined distance below Byron WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020281 WLA Re-evaluation	EPA Approved TMDL
BH	10080014	SHOSHONE RIVER	2AB	Undetermined distance below Cody WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020451 WLA Re-evaluation	EPA Approved TMDL
BR	16010101	BEAR RIVER	2AB	Undetermined distance below North Uinta County W&S District WWTP	Ammonia, Fecal Coliform, Chlorine	WY0031712 WLA Re-evaluation	EPA Approved TMDL
GR	14040101	MUDDY CREEK	2AB	Undetermined distance below Marbleton WWTP	Ammonia, Fecal Coliform, Chlorine	WY0021997 WLA Re-evaluation	EPA Approved TMDL
GR	14040107	BLACKS FORK GREEN RIVER	2AB	Undetermined distance below Granger WWTP	Ammonia, Fecal Coliform, Chlorine	WY0022373 WLA Re-evaluation	EPA Approved TMDL
GR	14040107	HAMS FORK GREEN RIVER	2AB	Undetermined distance below Kemmerer-Diamondville WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020320 WLA Re-evaluation	EPA Approved TMDL
GR	14040107	SMITHS FOR GREEN RIVER	2AB	Undetermined distance below Mountain View WWTP	Ammonia, Fecal Coliform, Chlorine	WY0022896 WLA Re-evaluation	EPA Approved TMDL
NP	10180004	MEDICINE BOW RIVER	2AB	Undetermined distance below Medicine Bow WWTP	Ammonia, Fecal Coliform, Chlorine	WY0020257 WLA Re-evaluation	EPA Approved TMDL

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Monitoring & Assessment Design Workbook

Appendix H
Assessment Protocols for Listing and Delisting

CONSIDERATION FOR DETERMINING PRIORITY OF THE TMDL LIST

Prioritizing Criteria

These criteria have been developed to provide a general guideline for prioritizing the TMDL List in Wyoming. The actual schedule for establishing TMDLs is contained in the Wyoming TMDL Workplan. These criteria will be used to implement the specifics of that schedule. While the priorities established using these criteria will be generally followed, circumstances may dictate adjustments based on petitions from other entities, efficiency and geographic practicality of addressing high and low priorities at the same time. Waterbodies for which the state has jurisdiction within the exterior boundaries of the Wind River Indian Reservation, waterbodies whose uses are "threatened," and waterbodies which cross political boundaries are prioritized using these criteria. However, these special conditions may result in some adjustment in the schedule for development of the TMDLs. Where local stakeholder groups have committed, since the last listing process, to develop a watershed plan the segment will be moved to a low priority and the local group given time to develop remediation plans. See LOW priority number 4.

High Priority

1. High priority for development of TMDLs shall be based on the potential ecologic and human health hazards associated with specific pollutants. Such pollutants are generally toxic pollutants and pathogens associated with point source discharges since toxics are usually the ecologic concern and pathogens the human health concern.

2. Waters receiving loadings from point source discharges with an NPDES permit due to be issued/reissued in the next biennium will receive highest priority where TMDLs need to be established to maintain beneficial uses of the receiving waters.

3. Major point source dischargers shall receive higher priority than minor dischargers due to potential ecological and human health risks associated with volume of pollutant load.

4. Highest quality waters (Classes 1 and 2) will receive highest priority, regardless of pollutant source in establishing TMDLs. (With exceptions as noted)

5. TMDL development shall be a high priority for those waterbodies where a locally sponsored stakeholder group has established or will establish over the biennium a water quality management plan which has all the components of a TMDL and where such group is seeking approval of the plan as a TMDL. Upon approval, such waterbodies shall be delisted.

6. If there are threatened or endangered aquatic species present and possibly affected by the pollutant(s) of concern, the waterbody is ranked as a high priority waterbody needing a TMDL unless a watershed plan has been approved by DEQ that addresses the endangered species issues.

7. If there is a public water supply located below the impaired segment then the segment will be ranked as a high priority waterbody needing a TMDL.

Medium Priority

1. Medium priority waterbodies shall be those receiving loadings from point source discharges in which major point source discharge permits to Class 1, 2 and 3 waters are not due for reissuance until after the beginning of the new 2 year list period unless there is an identified problem site which would not be on the list and therefore should be prioritized based on degree of impairment of uses.

2. TMDLs which address controls on nonpoint sources shall be developed as medium priorities where adequate data exists to establish load allocations and where no locally sponsored stakeholder group has developed an implementation plan. Such data is (or will be) obtained through local sponsorship of water quality assessment or through DEQ verification of the 1996 303(d) list, and subsequent intensive monitoring sufficient to establish TMDLs which address nonpoint source controls.

3. If there are candidate aquatic (T & E) species present and possibly affected by the pollutant(s) of concern, the waterbody will be ranked as a medium priority waterbody needing a TMDL.

Low Priority

1. TMDL development shall be a low priority for those waterbodies impacted by pollutants which pose a lower ecological and human health risk (i.e., non-toxic pollutants such as clean sediment).

2. TMDL development shall be a low priority for those waterbodies on which insufficient water quality data exists to reasonably determine the cause(s) of the pollutant load.

3. TMDL development shall be a low priority on those waterbodies which have been determined to be naturally of very low quality (i.e., Class 3C waters).

4. TMDL development shall be a low priority for those waterbodies where locally sponsored stakeholder groups have committed to establish to watershed management plan. Watershed Management Plans must identify the problems, solutions, and describe an implementation strategy to ensure that designated uses will be restored in a reasonable amount of time.

5. TMDL development shall be a low priority for waterbodies petitioned for stream reclassification, when the petition includes credible data. (Petitions which are not based upon credible data will not be considered.) Upon promulgation of the reclassification, the waterbody will be moved to the "monitoring list" to determine if it is able to meet the beneficial uses associated with the new classification. Upon determination of impairment status, the waterbody will be listed and prioritized or delisted as appropriate.

6. TMDL development shall be a low priority if there are threatened or endangered aquatic species present and possibly affected by the pollutant(s) of concern and a watershed plan has been approved by DEQ that addresses the endangered species issues.

Drinking Water Source Protection

The source water protection program is not a consideration when determining whether a waterbody supports or does not support a designated use. However, once a waterbody has been determined to be not supporting a designated use then source water considerations are examined and if a source water diversion is below the impaired waterbody the waterbody will be listed as high priority for development of a TMDL. See prioritizing criteria above.

Ground Water Considerations

There is not criteria developed at the current time to determine the impacts of ground water on the quality of surface water. As ground water is discharged into surface water the impacts on surface water quality will need to be determined based on the quality and quantity of the ground water discharge.

Threatened and Endangered Species

Threatened and Endangered Species are not a consideration when determining whether a waterbody supports or does not support a designated use. However, once a waterbody has been determined to be not supporting a designated use then the Fish and Wildlife Service is notified of listing and a list of possible threatened and endangered species threatened and endangered in the watershed is solicited. If there are threatened or endangered aquatic species present and possibly affected by the pollutant(s) of concern, the waterbody is ranked as a high priority waterbody needing a TMDL unless a watershed plan has been approved by DEQ that addresses the endangered species issues. If there is a T & E species present the State will have to enter into Section 7 of the Threatened and Endangered Species Act. Consequently, the State will need to

approve the watershed plan before it can reduce the priority for development of a TMDL. If a candidate aquatic species is present then the segment will be listed medium for TMDL development. See prioritizing criteria above,

PUBLIC REVIEW

The department must provide an opportunity for public comment on the proposed list and prioritization of the list before it is filed with EPA. There are two opportunities for public review. The TMDL work group, an advisory group appointed by the Director of DEQ to assist the department in TMDL matters, is provided an opportunity to review and offer suggestions to a draft of the 305b Report and 303d list. After review by the work group the list is made available to the public and a response period of 60 days is provided. DEQ will consider all comments and objections before adopting a final list. A response to public comments will be prepared. After the comments are considered and the list finalize, the list is sent to EPA for approval. Where there is major objection to the proposed list, interested or affected parties may request a review of the final 303d list before the Water and Waste Advisory Board as outlined in the Continuing Planning Process. The advisory board may consider the comments and objections and make recommendations to the WQD.

WHAT IS THE PROCESS FOR DELISTING?

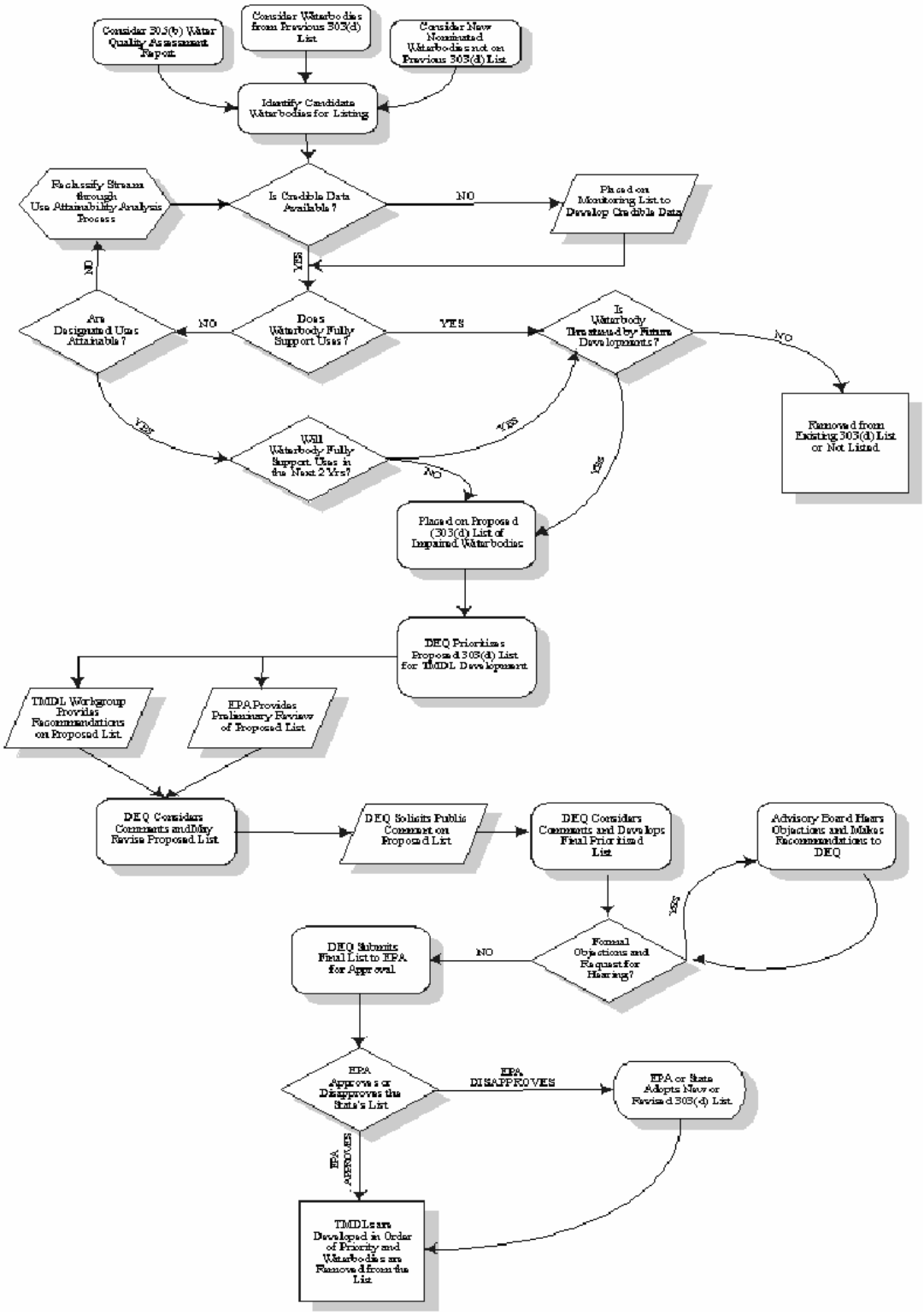
A waterbody will be delisted from the 303d list for good cause. Good cause includes, but is not limited to; more recent and accurate data, more sophisticated water quality modeling, flaws in the original analysis that led to the waterbody being listed, or changes in condition, e.g. new control equipment, elimination of discharges, or restoration of the water quality through planned projects.

The determination of whether a waterbody should be delisted will follow the same analytical procedure used to list it. Monitoring will have to demonstrate that the waterbody has met designated uses for Three consecutive years.

THE TMDL LISTING PROCESS AT A GLANCE

The TMDL listing process in schematic form is shown in Figure 1.

Figure 1. TMDL Listing Process



XX) Appendices Map

Main Website – http://deq.state.wy.us/wqd/watershed/index.asp

- Class - http://deq.state.wy.us/wqd/surfacestandards/Downloads/2-3648-doc.pdf
- Rules - http://deq.state.wy.us/wqd/surfacestandards/Downloads/11567-doc.pdf
- Methods - http://deq.state.wy.us/wqd/watershed/Downloads/TMDL/2-2223-doc.pdf
- 303(b) - http://deq.state.wy.us/wqd/watershed/Downloads/305b/4-0539doc.pdf

Appendix A – Found in the Method for Determining Water Quality Condition of Surface Waters http://deq.state.wy.us/wqd/watershed/Downloads/TMDL/2-2223-doc.pdf
See pages 1-12, 16-18.

Appendix B – Found in Water Quality Rules and Regulations at
http://deq.state.wy.us/wqd/surfacestandards/Downloads/11567-doc.pdf
See Appendix B on pages B-1 through B-10.

Information also found in the Method for Determining Water Quality Condition of Surface Waters http://deq.state.wy.us/wqd/watershed/Downloads/TMDL/2-2223-doc.pdf
See pages 19-20.

Appendix C – Found in Wyoming Surface Water Classification List at
http://deq.state.wy.us/wqd/surfacestandards/Downloads/2-3648-doc.pdf
See pages i,ii, A1-5, B1-3, B6, & B7.

Appendix D – Not available

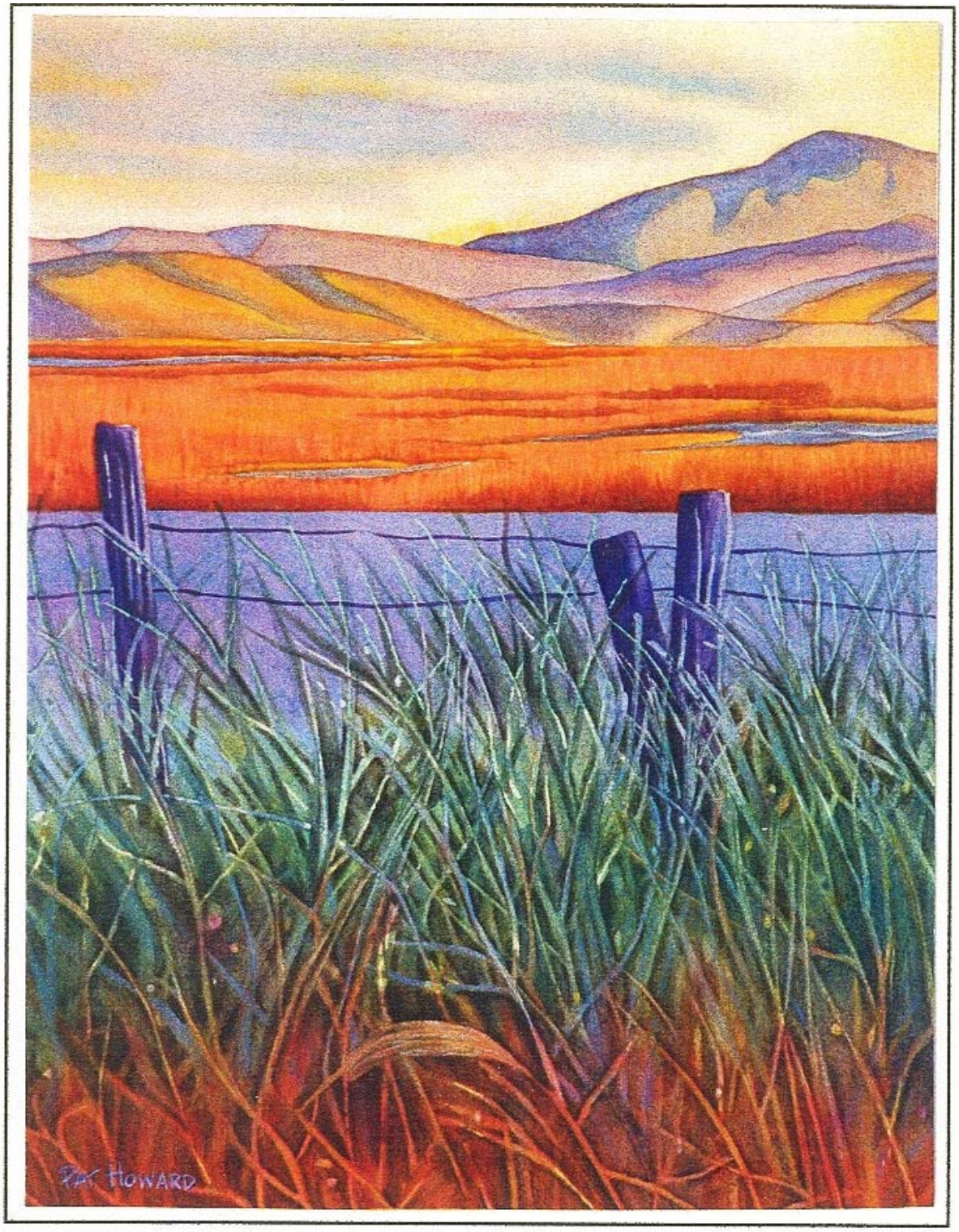
Appendix E – Found on a PDF created by the EPA entitled "Summary of Bioassessment Programs and Biocriteria Development" – Dec. 2002.
http://www.epa.gov/bioindicators/pdf/WY_summary_final.pdf

Appendix F – Not available

Appendix G – Found in Wyoming's 2004 305(b) State Water Assessment Report and 2004 303(d) List of Waters Requiring TMDL's
http://deq.state.wy.us/wqd/watershed/Downloads/305b/4-0539doc.pdf
See pages 81, and 90

Appendix H – Found in the Method for Determining Water Quality Condition of Surface Waters http://deq.state.wy.us/wqd/watershed/Downloads/TMDL/2-2223-doc.pdf
See pages 12-15, & 21

Antidegradation Policies



Colorado

I) Antidegradation Policy Contacts

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II) Antidegradation Policy

1) Antidegradation Rule

   a) The highest level of water quality protection applies to certain waters that constitute an outstanding state or national resource. These waters, which are those designated outstanding waters pursuant to section 31.8(2)(a), shall be maintained and protected at their existing quality

   b) An intermediate level of water quality protection applies to waters that have not been designated outstanding waters or use-protected waters. These waters shall be maintained and protected at their existing quality unless it is determined that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. For these waters, no degradation is allowed unless deemed appropriate following an antidegradation review in accordance with section 31.8(3). Further, all applicable statutory and regulatory requirements for point sources and, if applicable control regulations have been adopted, all cost-effective and reasonable best management practices for nonpoint sources shall be met.

   c) At a minimum, for all state surface waters existing classified uses and the level of water quality necessary to protect such uses shall be maintained and protected. No further water quality degradation is allowable which would interfere with or become injurious to these uses. The classified uses shall be deemed protected if the narrative and numerical standards are not exceeded.

      The antidegradation review requirements in section 31.8(3) are not applicable to waters designated use-protected pursuant to section 31.8(2)(b). For these waters, only the protection specified in this subparagraph applies.

   d) Water quality designation and reviewable water provisions shall not be utilized in a manner that is contrary to the provisions of sections 25-8-102 and 25-8-104. C.R.S.

2) Water Quality-Based Designations

Waters which satisfy the criteria in subparagraph (a) below may be designated by the Commission as "outstanding waters". Waters which satisfy the criteria in subparagraph (b) below may be designated "use-protected." Waters not satisfying either set of criteria will remain undesignated, and will be subject to the antidegradation review provisions set forth in section 31.8(3), below.

a) Outstanding Waters Designation Waters may be designated outstanding waters where the Commission makes all of the following three determinations:

i) The existing quality for each of the following parameters is equal to or better than that specified in tables I, II, and III for the protection of aquatic life class 1, recreation class 1, and (for nitrate) domestic water supply uses:

Table I: dissolved oxygen, pH, fecal coliform, E. coli

Table II: chronic un-ionized ammonia, nitrate

Table III: chronic cadmium, chronic copper, chronic lead, chronic manganese, chronic selenium, chronic silver, and chronic zinc

The determination of existing quality shall be based on adequate representative data, from samples taken within the segment in question. Data must be available for each of the 12 parameters listed; provided, that if fecal coliform samples from within the segment are infeasible due to its location, and a sanitary survey demonstrates that there are no human sources present that are likely to impact quality in the segment in question, fecal coliform or E. coli data will not be required. "Existing quality" shall be the 85th percentile of the data for un-ionized ammonia, nitrate, and dissolved metals, the 50th percentile for total recoverable metals, the 15th percentile for dissolved oxygen, the geometric mean for fecal coliform and E. coli, and the range between the 15th and 85th percentiles for pH.

In addition, the foregoing notwithstanding, this test shall not be considered to be met if the Commission determines that, due to the presence of substantial natural or irreversible human-induced pollution for parameters other than those listed above, the quality of the waters in question should not be considered better than necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water.

ii) The waters constitute an outstanding natural resource, based on the following:

(1) The waters are a significant attribute of a State Gold Medal Trout Fishery, a National Park, National Monument, National Wildlife Refuge, or a designated Wilderness Area, or are part of a designated wild river under the Federal Wild and Scenic Rivers Act; or

(2) The Commission determines that the waters have exceptional recreational or ecological significance, and have not been modified by human activities in a manner that substantially detracts from their value as a natural resource.

iii) The water requires protection in addition to that provided by the combination of water quality classifications and standards and the protection afforded reviewable water under section 31.8(3).

b) Use-Protected Designation These are waters that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process.

i) Waters shall be designated by the Commission use-protected if any of the criteria below are met, except that the Commission may determine that those waters with exceptional recreational or ecological significance should be undesignated, and deserving of the protection afforded by the antidegradation review provisions of section 31.8(3):

(1) The use classifications of the waters include aquatic life cold or warm water class 2;

(2) The existing quality for at least three of the following parameters is worse than that specified in tables I, II and III for the protection of aquatic life class 1, recreation class 1 and (for nitrate) domestic water supply uses:

Table I: dissolved oxygen, pH, fecal coliform or E. coli

Table II: chronic un-ionized ammonia, nitrate

Table III: chronic cadmium, chronic copper, chronic lead, chronic manganese, chronic selenium, chronic silver, and chronic zinc

The determination of existing quality shall be based on adequate representative data, from samples taken within the segment in question. Data must be available for each of the 12 parameters listed; provided, that if fecal coliform or E. coli samples from within the segment are infeasible due to its location, and a sanitary survey demonstrates that there are no human sources present that are likely to impact quality in the segment in question, fecal coliform data will not be required. "Existing quality" shall be the 85th percentile of the data for un-ionized ammonia, nitrate, and the dissolved metals, the 50th percentile for total recoverable metals, the 15th percentile of such data for dissolved oxygen, the geometric mean of such data for fecal coliform and E. coli, and the range between the 15th and 85th percentiles for pH; or

(3) The water body is subject to significant existing point source discharges and the quality currently is maintained better than standards only because the treatment achieved by the existing dischargers exceeds requirements of federal and state law and might not be maintained at that level in the future.

(a) In addition, waters may be designated use-protected even though none of the preceding criteria apply if the Commission determines that due to the presence of substantial natural or irreversible human-induced pollution for parameters other than those listed in section 31.8(2)(b)(i)(B) the quality of the waters in question should not be considered better than necessary to support aquatic life class 1 and recreation class 1 uses.

3) Antidegradation Review Process

a) Applicability

These antidegradation review procedures shall apply to the review of regulated activities with new or increased water quality impacts that may degrade the quality of state surface waters that have not been designated as outstanding waters or use-protected waters, including waters previously designated as high quality class 2. These waters are referred to below as "reviewable waters." "Regulated activities" means any activities which require a discharge permit or water quality certification under federal or state law, or which are subject to state control regulations unless the Commission has specified in the control regulation that the antidegradation review process is not applicable. Where possible, the antidegradation review should be coordinated or consolidated with the review processes of other agencies concerning a proposed activity in an effort to minimize costs and delays for such activities.

b) Division and Commission Roles

For regulated activities, the significance determination set forth in section 31.8(3)(c) and the determination whether degradation is necessary to accommodate important economic or social development in the area in which the waters are located, pursuant to section 31.8(3)(d), shall be made by the Division, subject to a de novo review by the Commission in an adjudicatory hearing, on the Commission's own motion, pursuant to a petition by any interested person who has submitted written comments during the Division review process, or on the Commission's determination pursuant to section 24-4-105(2), C.R.S.

c) Significance Determination

The initial step in an antidegradation review shall be a determination whether the regulated activity in question is likely to result in significant degradation of reviewable waters, with respect to adopted narrative or numeric standards. The significance determination will be based on the chronic numeric standard and flow for the pollutant of concern except for those pollutants which have only acute numeric standards in which case the acute standard and flow will be used. This significance determination shall be made with respect to the net effect of the new or increased water quality impacts of the proposed regulated activity, taking into account any environmental benefits resulting from the regulated activity and any water quality enhancement or mitigation measures impacting the segment or segments under review, if such measures are incorporated with the proposed regulated activity. The regulated activity shall be considered not to result in significant degradation, as measured in the reviewable waters segment, if:

i) For biocumulative toxic pollutants, (i.e., those chemicals for which the bioaccumulation factor (BAF) is equal to or greater than 1000) the new or increased loading from the source under review is less than 10 percent of the existing total load to that portion of the segment impacted by the discharge for critical constituents; provided, that the cumulative impact of increased loadings from all sources shall not exceed 10 percent of the baseline total load established for the portion of the segment impacted by the discharge

(the baseline total load shall be determined at the time of the first proposed new or increased water quality impacts to the reviewable waters.); and

ii) For all pollutants:

(1) The flow rate or volume of a new or increased discharge under review is small enough that it will be diluted by 100 to 1 or more at low flow, as defined in section 31.9, by water in the stream; or

(2) The new activity or increased discharge from the source under review will consume, after mixing, less than 15 percent of the baseline available increment, provided that the cumulative increase in concentration from all sources shall not exceed 15 percent of the baseline available increment. The baseline available increment is the increment between low-flow pollutant concentrations and the relevant standards for critical constituents for that portion of the segment impacted by the discharge. The baseline low-flow pollutant concentration shall represent the water quality as of September 30, 2000, and shall be determined at the time of the first proposed new or increased water quality impacts to the reviewable waters after that date; or

(3) The regulated activity will result in only temporary or short term changes in water quality. This exception shall not apply where long-term operation of the regulated activity will result in an adverse change in water quality.

For the purposes of this subsection, the phrase .portion of the segment impacted by the discharge. means the portion of the stream from the discharge point to the first major tributary inflow, or as determined by the Division based on site-specific information at the time of the analysis.

4) Necessity of Degradation Determination

If a determination has been made in accordance with section 31.8(3)(c) that a proposed regulated activity is likely to result in significant degradation of reviewable waters, a determination shall be made pursuant to this section whether the degradation is necessary to accommodate important economic or social development in the area in which the waters are located. The following provisions shall apply to this determination:

a) The "area in which the waters are located" shall be determined from the facts on a case-by-case basis. The area shall include all areas directly impacted by the proposed regulated activity.

b) A determination shall be made from the facts on a case-by-case basis whether the proposed regulated activity is important economic or social development. If the activity proponent submits evidence that the regulated activity is important development, it shall be presumed important unless information to the contrary is submitted in the public review process. The determination shall take into account information received during the public comment period and shall give substantial weight to any applicable determinations by local governments or land use planning authorities.

c) If the proposed regulated activity is determined to be important economic or social development, a determination shall be made whether the degradation that would result from such regulated activity is necessary to accommodate that development. The degradation shall be considered necessary if there are no water quality control alternatives available that (A) would result in no degradation or less degradation of the state waters and (B) are determined to be economically, environmentally, and technologically reasonable.

This determination shall be based on an assessment of whether such alternatives are available, based upon a reasonable level of analysis by the project proponent, consistent with accepted engineering practice, and any information submitted by the public or which is otherwise available. The assessment shall address practical water quality control technologies, the feasibility and availability of which has been demonstrated under field conditions similar to those of the activity under review. The scope of alternatives considered shall be limited to those that would accomplish the proposed regulated activity's purpose. Any alternatives that would be inconsistent with section 25-8-104 of the Water Quality Control Act shall not be considered available alternatives.

In determining the economic reasonableness of any less-degrading water quality control alternatives, the Division may take into consideration any relevant factors, including but not limited to the following, if applicable:

i) Whether the costs of the alternative significantly exceed the costs of the proposal;

ii) For publicly owned treatment works (POTWs) or public water supply projects, whether user charges resulting from the alternative would significantly exceed user charges for similarly situated POTWs or public water supply projects;

iii) For private industry, whether the alternative would have a significant adverse effect upon the project's profitability or competitive position (if the project proponent chooses to provide such information);

iv) For any dischargers, whether treatment costs resulting from the alternative would significantly exceed treatment costs for any similar existing dischargers on the segment in question.

v) The relative, long-term, energy costs and commitments and availability of energy conservation alternatives.

5) Public Participation and Intergovernmental Coordination

Procedural provisions relating to public participation and intergovernmental coordination and antidegradation reviews are set forth in the Procedural Rules, Regulation No. 21, section 21.16 (5 CCR 1002-21).

6) Public Nomination-Water Quality Based Designations

Any person may nominate any state water for designation as outstanding waters or use-protected during triennial review or at any time. Such nomination shall include written documentation of the qualifications for such designation based upon the criteria in section 31.8(2)(a) or (b).

7) Protection of Existing Uses

If, during an antidegradation review, it is determined that an existing use of the affected waterbody has not been classified, prior to completing the antidegradation review for an applicable regulated activity, an expeditious rulemaking hearing shall be held (on an emergency basis if necessary) to consider adoption of the additional classification.

III) Antidegradation Implementation Procedures

The rules are in the "Basic Standards" (regulation 31, at 31.8) these were revised in July 2000, http://www.cdphe.state.co.us/op/waterqualitycontcommregs.asp. New guidance for implementation of these regulations is at http://www.cdphe.state.co.us/wq/Assessment/assessment_practices_and_methods.htm.

IV) Water Designation Lists

List of designated Tier III Waters

There is no list, but Colorado does have waters that are designated "Outstanding Waters" (our version of Tier III). The AD designations of all of our waters are included on the standards tables in Regulations 32, 33, 34, 35, 36, 37, & 38. These are available at http://www.cdphe.state.co.us/op/waterqualitycontcommregs.asp There has been no pressure to form a list.

Colorado's Outstanding Waters:

Regulation 32: Arkansas River Basin

Upper Arkansas River Basin

- All streams, wetlands, lakes, and reservoirs within Mount Massive and Collegiate Peaks Wilderness Areas

Regulation 35: Gunnison and Lower Dolores River Basins

Upper Gunnison River Basin

- All tributaries, including lakes, reservoirs, and wetlands, within the LaGarita Wilderness Area.
- All tributaries to the Gunnison River, including lakes, reservoirs, and wetlands, within the West Elk, Collegiate Peaks, Maroon Bells, Raggeds, Fossil Ridge, and Oh-Be-Joyful Wilderness Areas.
- All tributaries to the Gunnison, including lakes, reservoirs, and wetlands, within the Big Blue Wilderness Area.

North Fork of the Gunnison River Basin

- All tributaries to the North Fork of the Gunnison River, including all lakes, reservoirs, and wetlands, within the West Elk and Raggeds Wilderness Areas.

Uncompahgre River Basin

- All tributaries to the Uncompahgre River, including lakes, reservoirs, and wetlands, which are within the Mt. Sneffels and Big Blue Wilderness Areas

San Miguel River Basin

- All streams, lakes, reservoirs, and wetlands within the boundaries of the Lizard Head and Mt. Sneffels Wilderness Areas

Regulation 37: Lower Colorado River Basin

White River Basin

- Trappers Lake, including all tributaries to Trappers Lake

Regulation 38: South Platte River Basin, Laramie River Basin, Republican River Basin, Smoky Hill River Basin

Upper South Platte River Basin

- All tributaries to the South Platte River, including lakes, reservoirs, and wetlands within the Lost Creek and Mt. Evans Wilderness Areas

Bear Creek Basin

- All tributaries to Bear Creek, including lakes, reservoirs, and wetlands within the Mt. Evans Wilderness Area

Clear Creek Basin

- All tributaries to Clear Creek, including lakes, reservoirs, and wetlands, within the Mt. Evans Wilderness Area

Boulder Creek Basin

- All tributaries to Boulder Creek, including lakes, reservoirs, and wetlands, within the Indian Peaks Wilderness Area

St. Vrain Creek Basin

- All tributaries to St. Vrain Creek, including lakes, reservoirs, and wetlands, which are within the Indian Peaks Wilderness Area and Rocky Mountain National Park.

Big Thompson River Basin

- All tributaries to Big Thompson River system, including lakes, reservoirs, and wetlands, which are within Rocky Mountain National Park, except for specific listings within Segment 2. [Segment 2 (No designation) = Mainstem of the Big Thompson River, including all tributaries, lakes, and wetlands from the boundary of Rocky Mountain National Park to the Home Supply Canal diversion, except for the specific listing in Segment 7; mainstem of Black Canyon Creek and Glacier Creek below Estes Park water treatment plant.

Segment 7 (No designation) = Mainstem of the North Fork of the Big Thompson River from the boundary of Rocky Mountain National Park to the confluence with the Big Thompson River; mainstem of Buckhorn Creek from the source to the confluence with the Big Thompson River.]

Cache La Poudre River Basin

- Mainstem of the Cache La Poudre River, and all tributaries, including lakes, reservoirs, and wetlands, within Rocky Mountain National Park and the Rawah, Neota, Comanche Peak, and Cache La Poudre Wilderness Areas.

Laramie River Basin

- All tributaries to the Laramie River, including lakes, reservoirs, and wetlands, which are within the Rawah Wilderness Area.

Regulations 34 (San Juan River & Dolores River Basins) and 36 (Rio Grande River Basin) have no Outstanding Waters.

Tier II ½ Classification (designated waters, policy, regulations, and/or implementation procedures)
Colorado has no Tier II ½.

Tiers I and II Formally Designated
No list, but Colorado does have waters designated. All AD designations are provided in the basin standards regulations.

The antidegradation information above was provided by:
Colorado Department of Public Health and Environment

V) Latest Antidegradation News

5/22/2003 At the last meeting of the Colorado Water Quality Control Commission, the new Division Director commented that the implementation of the new guidance has gone well but that antidegradation issues have not affected the large majority of streams in Colorado.
For more information:
Antidegradation documents are available at http://www.cdphe.state.co.us/ or call the Division at (303) 692-3500.

6/29/2001 New antideg implementation procedures are proposed. A few environmental groups are involved.
For more information:
Contact Steve Glazer, High Country Citizens Alliance.
http://www.hccaonline.org

Montana

I) Antidegradation Policy Contacts

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or

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II) Antidegradation Policy

1) "Outstanding resource waters" means:

   a) state surface waters located wholly within the boundaries of areas designated as national parks or national wilderness areas as of October 1, 1995; or

   b) other surface waters or ground waters classified by the board under the provisions of 75-5-316 and approved by the legislature.

2) "High-quality waters" means all state waters, except:

   a) ground water classified as of January 1, 1995, within the "III" or "IV" classifications established by the board's classification rules; and

   b) surface waters that:

      i) are not capable of supporting any one of the designated uses for their classification; or
      ii) have zero flow or surface expression for more than 270 days during most years.

Simply put, the purpose of the nondegradation rules is to protect high quality state ground and surface waters. High quality waters are those waters whose quality is higher than the established standards (high quality state waters are defined in 75-5-103(10), MCA). Some nondegradation limits are set at definite concentrations called trigger levels (listed in Department Circular WQB-7) or at a percentage of the lowest applicable water quality standard. Other nondegradation limits are qualitative, such as those for nitrogen and phosphorus in surface water. Whenever a person conducts an activity that may impact water quality, they must comply with the nondegradation requirements (this applies whether the activity is or is not regulated by the Department). If the activity is

regulated by the Department, the Department will ensure compliance with the nondegradation requirements prior to issuing its permit, license or other authorizations. A person may also request a nondegradation significance determination and submit information to the Department to demonstrate the activity will cause nonsignificant degradation of state waters. The proposed activity may not begin until the Department has determined the activity will cause nonsignificant degradation or has issued an authorization to degrade (authorizations to degrade are explained later).

17.30.705. Nondegradation Policy -- Applicability and Limitation.

1) The provisions of this subchapter apply to any activity of man resulting in a new or increased source which may cause degradation.

2) Department review of proposals for new or increased sources will determine the level of protection required for the impacted water as follows:

   a) For all state waters, existing and anticipated uses and the water quality necessary to protect those uses must be maintained and protected.

   b) For high quality waters, degradation may be allowed only according to the procedures in ARM 17.30.708. These rules apply to any activity that may cause degradation of high quality waters, for any parameter, unless the changes in existing water quality resulting from the activity are determined to be nonsignificant under ARM 17.30.715 or 17.30.716. If degradation of high quality waters is allowed, the department will assure that within the United States geological survey hydrologic unit upstream of the proposed activity, there shall be achieved the highest statutory and regulatory requirements for all point and nonpoint sources. This assurance will be achieved through ongoing administration by the department of mandatory programs for control of point and nonpoint discharges.

   c) For outstanding resource waters, no degradation is allowed and no permanent change in the quality of outstanding resource waters resulting from a new or increase point source discharge is allowed.

3) The department will comply with the provisions of the Montana Environmental Policy Act in the implementation of this subchapter.

17.30.707. Department Procedures for Nondegradation Review.

1) Upon a determination by the department that an application to degrade state waters required under this rule is complete, the department will prepare a preliminary decision either authorizing degradation or denying the application to degrade according to the procedures in ARM 17.30.708.

2) An application to degrade state waters will be denied unless the applicant has affirmatively demonstrated and the department finds, based on a preponderance of evidence, the proposed activity to be in full compliance with 75-5-303, MCA, using the standards set out in (3) - (6) below. The department shall consider an analysis by the applicant and any substantive relevant information either submitted by the public or otherwise available.

3) To determine that degradation is necessary because there are no economically, environmentally, and technologically feasible alternatives to the proposed activity that would result in no degradation, the department shall consider the following:

   a) The department will determine the economic feasibility of the alternative water quality protection practices by evaluating the cost effects of the proposed alternatives on the economic viability of the project and on the applicant by using standard and accepted financial analyses.

   b) In order to determine the environmental feasibility of an alternative, the department will consider whether such alternative practices are available and will compare the overall environmental impacts of the various alternatives and the commitment of resources necessary to achieve the alternatives.

   c) In order to determine technological feasibility of an alternative, the department will consider whether such alternative practices are available and consistent with accepted engineering principles.

4) To determine that the proposed activity will result in important economic or social development that exceeds the benefit to society of maintaining existing high-quality waters and exceeds the costs to society of allowing degradation of high-quality waters, the department must find that the proposed activity will provide important economic or social development which outweighs any cost to society of allowing the proposed change in water quality.

   a) In making its determination, the department may consider factors that include, but are not limited to, the following:

      i) effects on the state or local community resulting from increased employment opportunities, considering the existing level of employment, unemployment, and wage levels in the area;

      ii) effects on the state or local economies;

      iii) effects on the fiscal status of the local, county or state governments and local public schools;

      iv) effects on the local or state economies (i.e., increased or reduced diversity, multiplier effects);

      v) effects on social or historical values;

      vi) effects on public health;

      vii) effects on housing (i.e., availability and affordability);

      viii) effects on existing public service systems and local educational systems; or

      ix) correction of an environmental or public health problem.

b) In making the determination required in (a) above, the department must weigh any costs associated with the loss of high quality waters against any social or economic benefits demonstrated by the applicant. The department may also consider as a cost to society any identified and/or quantifiable negative social or economic effects resulting from the proposed activity.

5) To determine that existing and anticipated uses of the receiving waters will be fully protected and that water quality standards will not be violated as a result of the proposed degradation, the department shall consider all available information.

6) In order to authorize degradation under this rule, the department must determine that the least degrading water quality protection practices determined by the department to be economically, environmentally, and technologically feasible will be implemented prior to, during, and after the proposed activity until the degradation no longer occurs.

7) The department shall make its preliminary decision either authorizing degradation or denying the application to degrade within 180 days after receipt of a complete application from the applicant. This time period may be extended upon agreement of the applicant or whenever an environmental impact statement must be prepared pursuant to Title 75, chapter 1, parts 1 and 2, MCA.

8) To the maximum extent possible, the department will coordinate any application to degrade state waters with the permitting and approval requirements of other laws or programs administered by the department or by any other local, state, or federal agency.

III) Antidegradation Implementation Procedures

There is currently no information regarding antidegradation implementation procedures listed for this state.

IV) Water Designations

List of designated Tier III Waters
Listed Outstanding Resource Waters are defined to be national wilderness areas and national parks. See 75-5-103(20) MCA.

Tier II ½ Classification (designated waters, policy, regulations, and/or implementation procedures)
None

Tiers I and II Formally Designated
None

This antidegradation information above was provided by:
Chris Levine, Montana Department of Environmental Quality

Useful Documents:
EPA Federal and Regional Guidance on Antidegradation.
Montana's Antidegradation Policy. Collected by Prairie Rivers Network, June 2001.

IV) Latest Antidegradation News

4/1/2002 American Wildlands received a 4-2 vote by the Board of Environmental Review to accept their petition to list the 45 mile section of the Gallatin River as an Outstanding Resource Water. It has taken two years to make it through this hurdle. Next step: an EIS.

For more information:
http://www.wildlands.org

3/1/2002 American Wildlands is still trying to get the Gallatin River designated as an ONWR (Montana's first). In January 2002, the Board of Environmental Review decided not to make a decision yet because they don't want to pay for Montana DEQ to do an Environmental Impact Study (which is required by the Montana Environmental Policy Act).
For more information:
http://www.wildlands.org

6/29/2001 Arguments on the American Wildlands water quality standards lawsuit were heard in the 10th Circuit in May.

For more information:
Contact Steve Mashuda, Earthjustice Seattle

6/29/2001 American Wildlands petitions for ONRW designation for the Gallatin River from Yellowstone Park to Spanish Creek. First citizen petition for a Montana ONRW.

For more information:
http://www.wildlands.org

New Mexico

I) Antidegradation Policy Contacts

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II) Antidegradation Policy

New Mexico has antidegradation incorporated into the Water Quality Standards in Section 20.6.4.8 NMAC, which is available on the New Mexico Environment Department's website at http://www.nmenv.state.nm.us under the Water and Waste Management Division - Surface Water Quality Bureau section.

A. This antidegradation policy applies to all surface waters of the state.

(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected in all surface waters of the state.

(2) Where the quality of a surface water of the state exceeds levels necessary to support the propagation of fish, shellfish, and wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the commission finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic and social development in the area in which the water is located. In allowing such degradation or lower water quality, the state shall assure water quality adequate to protect existing uses fully. Further, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable BMPs for nonpoint source control. Additionally, the state shall encourage the use of watershed planning as a further means to protect surface waters of the state.

(3) No degradation shall be allowed in high quality waters designated by the commission as outstanding national resource waters (ONRWs). ONRWs may include, but are not limited to, surface waters of the state within national and state monuments, parks, wildlife refuges, waters of exceptional recreational or ecological significance, and waters identified under the Wild and Scenic Rivers Act.

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, this antidegradation policy and implementing method shall be consistent with Section 316 of the federal Clean Water Act.

(5) In implementing this section, the commission through the appropriate regional offices of the United States environmental protection agency will keep the administrator advised and provided with such information concerning the surface waters of the state

as he or she will need to discharge his or her responsibilities under the federal Clean Water Act.

III) Antidegradation Implementation Procedures

Procedures for nominating an ONRW: Any person may nominate a surface water of the state for designation as an ONRW by filing a petition with the commission pursuant to the Guidelines for water quality control commission regulation hearings. A petition to classify a surface water of the state as an ONRW shall include:

(1) a map of the surface water of the state, including the location and proposed upstream and downstream boundaries;

(2) a written statement based on scientific principles in support of the nomination, including specific reference to the applicable criteria for ONRW;

(3) supporting scientific evidence demonstrating that one or more of the applicable ONRW criteria listed in Subsection C of this section has been met;

(4) water quality data to establish a baseline for the proposed ONRW;

(5) a discussion of activities that might contribute to the reduction of water quality in the proposed ONRW;

(6) any additional evidence to substantiate such a designation, including an analysis of the economic impact of the designation on the local and regional economy within the state of New Mexico; and

(7) affidavit of publication of notice of the petition in a newspaper of general circulation in the affected counties and in a newspaper of general statewide circulation.

C. Pursuant to a petition filed under Subsection B of this section, the commission may classify a surface water of the state as an ONRW.

D. Reserved: This subsection is reserved for a list of waters classified as ONRWs.

E. Implementation Plan: The department, acting under authority delegated by the commission, implements the water quality standards, including the antidegradation policy, by describing specific methods and procedures in the continuing planning process and by establishing and maintaining controls on the discharge of pollutants to surface waters of the state. The steps summarized in the following paragraphs, which may not all be applicable in every water pollution control action, list the implementation activities of the department. These implementation activities are supplemented by detailed antidegradation review procedures developed under the state's continuing planning process. The department:

(1) obtains information pertinent to the impact of the effluent on the receiving water and advises the prospective discharger of requirements for obtaining a permit to discharge;

(2) reviews the adequacy of the existing data base, and if additional information is needed, conducts a water quality survey of the receiving water in accordance with an annually reviewed, ranked priority list of surface waters of the state requiring total maximum daily loads pursuant to Section 303(d) of the federal Clean Water Act;

(3) assesses the probable impact of the effluent on the receiving water relative to its attainable or designated uses and numeric and narrative standards;

(4) requires the highest and best degree of wastewater treatment practicable and commensurate with protecting and maintaining the designated uses and existing water quality of surface waters of the state;

(5) develops water quality based effluent limitations and comments on technology based effluent limitations, as appropriate, for inclusion in any federal permit issued to a discharger pursuant to Section 402 of the federal Clean Water Act;

(6) requires that these effluent limitations be included in any such permit as a condition
for state certification pursuant to Section 401 of the federal Clean Water Act;
(7) coordinates its water pollution control activities with other constituent agencies of the commission, and with local, state and federal agencies, as appropriate;
(8) develops and pursues inspection and enforcement programs to ensure that dischargers comply with state regulations and standards, and complements EPA's enforcement of federal permits;
(9) ensures that the provisions for public participation required by the New Mexico Water Quality Act and the federal Clean Water Act are followed;
(10) provides continuing technical training for wastewater treatment facility operators through the utility operators training and certification programs;
(11) provides funds to assist the construction of publicly owned wastewater treatment facilities through the wastewater construction program authorized by Section 601 of the federal Clean Water Act, and through funds appropriated by the New Mexico legislature;
(12) conducts water quality surveillance of the surface waters of the state to assess the effectiveness of water pollution controls, determines whether water quality standards are being attained, and proposes amendments to improve water quality standards;
(13) encourages, in conjunction with other state agencies, voluntary implementation of
the best management practices set forth in the New Mexico statewide water quality management plan and the nonpoint source management program;
(14) evaluates the effectiveness of BMPs selected to prevent, reduce or abate sources
of water pollutants;
(15) develops procedures for assessing use attainment as required by 20.6.4.14 NMAC
and establishing site-specific standards; and
(16) develops list of surface waters of the state not attaining designated uses, pursuant to Sections 305(b) and 303(d) of the federal Clean Water Act.
[20.6.4.8 NMAC – Rp 20 NMAC 6.1.1101, 10-12-00]

Current procedures not already specified in New Mexico's Water Quality Standards or continuing Planning Process are in the process of review and formalization.

IV) Water Designations

List of designated Tier III Waters
A section of the water quality standards has been reserved for such a list but to date no waters have been listed. A procedure is also specified in the standards that allow anyone to nominate a water for listing. Some environmental advocacy groups have expressed interest regarding the listing of waters as Tier III.

Tier II ½ Classification (designated waters, policy, regulations, and/or implementation procedures)
N/A

Tiers I and II Formally Designated

Waters are not formally designated as Tier I or II, however, New Mexico's Clean Water Act Section 303(d) list and Section 305(b) report would be other references.

V) Latest Antidegradation News

3/1/2002 Forest Guardians filed a 60-day Notice of Intent to Sue within the last four months over New Mexico's antidegradation policy. EPA disapproved the policy because it refers people to the state's Continuing Planning Process for detail, but the CPP doesn't actually contain that detail. The antidegradation policy has yet to be fixed.

For more information:
Contact: Forest Guardians, (505)988-9126, http://www.fguardians.org/

10/4/2001 Amigos Bravos is preparing to nominate New Mexico's first ONRW, the Santa Barbara River.

For more information:
http://www.amigosbravos.org

North Dakota

Summary

North Dakota's Antidegradation Policy is found in the Water Quality Standards at http://www.health.state.nd.us/wq/sw/Z7_Publications/B_NDCC_WQS.pdf. Implementation procedures are included in Appendix 4.

I) Antidegradation Policy Contacts

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II) Antidegradation Policy

North Dakota's Antidegradation Policy is found in the Water Quality Standards at http://www.health.state.nd.us/wq/sw/Z7_Publications/B_NDCC_WQS.pdf. Implementation procedures are included in Appendix 4.

This antidegradation implementation procedure delineates the process that will be followed by the North Dakota Department of Health for implementing the antidegradation policy found in the Standards of Water Quality for the State of North Dakota, Rule 33-16-02.

Under this implementation procedure, all waters of the state are afforded one of three different levels of antidegradation protection. All existing uses, and the water quality necessary for those uses, shall be maintained and protected. Antidegradation requirements are necessary whenever a regulated activity is proposed that may have some effect on water quality. Regulated actions include permits issued under Section 402 (NDPDES) and 404 (Dredge and Fill) of the Clean Water Act (CWA), and any other activity requiring Section 401 water quality certification. Nonpoint sources of pollution are not included. When reviewing 404 nationwide permits, the department will issue 401 certifications only where it determines that the conditions imposed by such permits are expected to result in attainment of the applicable water quality standards, including the antidegradation requirements. However, it is anticipated that the department will exclude certain nationwide permits from the antidegradation procedures for Category 1 waters on the basis that the category of activities covered by the permit is not expected to have significant permanent effects on the quality and beneficial uses of those waters, or the effects will be appropriately minimized and temporary.

EXISTING USE PROTECTION FOR CATEGORY 1, 2, AND 3 WATERS

Existing use means a use that was actually attained in the water body on or after 1967, whether or not it is included in the water quality standards. This procedure presumes that attainment of the criteria assigned to protect the current water body classification will serve to maintain and protect all existing uses. However, where an existing use has water quality requirements that are clearly defined, but are not addressed by the current classification and criteria, the department will ensure that such existing uses are protected fully, based on implementation of appropriate numeric or narrative water quality criteria or criteria guidance. In some cases, water quality may have improved in the segment since the classification was assigned, resulting in attainment of a higher use. In other cases, the classification may have been assigned based on inadequate information, resulting in a classification that does not describe or adequately protect actual uses of the segment. In such cases, the department will develop requirements necessary to protect the existing uses and, where appropriate, recommend reclassification of the segment. 39 6/2001

III) Antidegradation Implementation Procedures

The department will complete an antidegradation review for all proposed regulated activities. The findings of these reviews will be summarized using an antidegradation worksheet. A statement of basis for all conclusions will be attached to the completed worksheet. The level of detail of the review will depend upon the antidegradation protection applicable to the various classes of water.

In conducting an antidegradation review, the Division of Water Quality will sequentially apply the following steps:

1) Determine which level of antidegradation applies.

2) Determine whether authorizing the proposed regulated activity is consistent with antidegradation requirements.

3) Review existing water quality data and other information submitted by the project applicant.

4) Determine if additional information or assessment is necessary to make a decision.

5) A preliminary decision is made by the department and subsequently distributed for public participation and intergovernmental coordination. The content of public notices will be determined case by case. In preparing a public notice, the department may address:

    a) the department's preliminary antidegradation review conclusions;

    b) a request for public input on particular aspects of the antidegradation review that might be improved based on public input (e.g., existing uses of a segment that needs to be protected);

    c) notice of the availability of the antidegradation review worksheet;

d) notice of the availability of general information regarding the state antidegradation program, and

e) a reference to the state antidegradation policy.

The antidegradation review findings will be available for public comment; however, publication of a separate notice for purposes of antidegradation is not necessary. For example, the antidegradation preliminary findings may be included in the public notice issued for purposes of an NDPDES permit or CWA § 401 certification.

The department will ensure appropriate intergovernmental coordination on all antidegradation reviews. At a minimum, the department will provide copies of the completed antidegradation review worksheet and/or the public notice to appropriate local, state, and federal government agencies, along with a written request to provide comments by the public comment deadline.

f) Comments are considered.

g) The department determines if the change in quality is necessary to accommodate important economic or social development.

h) The department makes a final decision. The level of antidegradation protection afforded each water body in the state is consistent with beneficial uses of those water bodies. Appendix I and Appendix II of the Standards of Water Quality for the State of North Dakota identify rivers, streams, and lakes in the state with their classification. The classification shall be consistent with the following water designations:

> Specific procedures of antidegradation for water designation categories are listed below after the description of each category.

Implementation procedures are included in Appendix 4 of the water quality standards at: http://www.health.state.nd.us/wq/sw/Z7_Publications/B_NDCC_WQS.pdf.

Useful Documents:
EPA Federal and Regional Guidance on Antidegradation.
North Dakota's Antidegradation Policy. Collected by Prairie Rivers Network, June 2001.

IV) Water Designations

From the North Dakota Water Quality Standards:

33-16-02.1-07. Classification of waters of the state. General.
Classification of waters of the state shall be used to maintain and protect the present and future beneficial uses of these waters. Classification of waters of the state shall be made or changed whenever new or additional data warrant the classification or a change of an existing classification.

History: Effective June 1, 2001.
General Authority: NDCC 61-28-04
Law Implemented: NDCC 23-33, 61-28

Category 1:

Very high level of protection that automatically applies to Class I and Class IA streams and Class 1, 2, and 3 lakes, and wetlands that are functioning at their optimal level. In addition, Category 1 is presumed to apply to Class II and Class III streams. Particular Class II and Class III streams may be excluded from Category 1 if, at the time of the antidegradation review, it is determined that one or both of the following criteria are applicable:

1) there is no remaining assimilative capacity for any of the parameters that may potentially be affected by the proposed regulated activity in the segment in question, or

2) an evaluation submitted by the project applicant demonstrates (based on adequate and representative chemical, physical, and biological data) that aquatic life and primary contact recreation uses are not currently being attained because of stressors that will require a long-term effort to remedy. Evaluations in response to Criterion #2 must include more than an identification of current water quality levels. They must include evidence of the current status of the aquatic life and primary contact recreation uses of the segment.

Category 2:

Class 4 and Class 5 lakes and particular wetlands after antidegradation review. In addition, Class II and Class III streams or wetlands meeting one of the criteria identified above at the time of the antidegradation review shall be included in Category 2.

Category 3:

Highest level of protection; Outstanding State Resource Waters.

Procedures for Category 1 Waters

Regulated activities that result in a new or expanded source of pollutants to this category of water are subject to the review process, unless the source would have no significant permanent effect on the quality and beneficial uses of those waters, or if the effects will be appropriately minimized and temporary.

Proposed activities that would lower the ambient quality in a water body of any parameter by more than 15 percent, reduce the available assimilative capacity by more than 15 percent, or increase permitted pollutant loadings to a water body by more than 15 percent will be deemed to have significant effects.

The department will identify and eliminate from further review those proposed activities that will have no significant effect on water quality or beneficial uses.

Category 1 reviews will be conducted where significant effects are projected for one or more water quality parameters. Findings of significant effects may be based on the following factors:

1) percent change in ambient concentrations predicted at the appropriate condition(s);

2) percent change in loadings for the individual discharge or to the segment from all discharges;

3) reduction in available assimilative capacity;

4) nature, persistence, and potential effects of the parameter;

5) potential for cumulative effects,

6) predicted impacts to aquatic biota; and

7) degree of confidence in any modeling techniques utilized.

The applicant may be required to provide available monitoring data or other information about the affected water body and/or proposed activity to help determine the significance of the proposed degradation for specific parameters. The information includes recent ambient chemical, physical, or biological monitoring data sufficient to characterize, during the appropriate condition(s), the spatial and temporal variability of existing background quality of the segment for the parameters that would be affected by the proposed activity. The information would also describe the water quality that would result if the proposed activity were authorized.

The project applicant is required to provide an evaluation of the water quality effects of the project. This evaluation may consist of the following components:

1) Pollution prevention measures

2) Reduction in scale of the project

3) Water recycle or reuse

4) Process changes

5) Alternative treatment technology

6) Advanced treatment technology

7) Seasonal or controlled discharge options to avoid critical water quality periods

8) Improved operation and maintenance of existing facilities

9) Alternative discharge locations

The primary emphasis of the Category 1 reviews will be to determine whether

reasonable non-degrading or less-degrading alternatives to the proposed degradation are available. The department will first evaluate any alternatives analysis submitted by the applicant for adherence to the minimum requirements described below. If an acceptable analysis of alternatives was completed and submitted to the department as part of the initial project proposal, no further evaluation of alternatives will be required of the applicant. If an acceptable alternatives analysis has not been completed, the department will work with the project applicant to ensure that an acceptable alternatives analysis is developed.

Once the department has determined that feasible alternatives to allowing the degradation have been adequately evaluated, the department shall make a preliminary determination regarding whether reasonable non-degrading or less-degrading alternatives are available. This determination will be based primarily on the alternatives analysis developed by the project applicant, but may be supplemented with other information or data. As a rule-of-thumb, non-degrading or less-degrading pollution control alternatives with costs that are similar to the costs of the applicant's favored alternative shall be considered reasonable. If the department determines that reasonable alternatives to allowing the degradation do not exist, the department shall continue with the antidegradation review and document the basis for the preliminary determination.

If the department makes a preliminary determination that one or more reasonable alternatives exist, the department will work with the applicant to revise the project design. If a mutually acceptable resolution cannot be reached, the department will document the alternative analysis findings and provide public notice of a preliminary decision to deny the activity. Although it is recognized that any activity resulting in a discharge to surface waters may have positive and negative aspects, the applicant must show that any discharge or increased discharge will be of economic or social importance in the area. Where there are existing regulated sources located in the area, the department will assure that those sources are complying with applicable requirements prior to authorizing the proposed regulated activity.

New sources of a particular parameter will not be allowed where there are existing unresolved compliance problems (involving the same parameter) in the zone of influence of the proposed activity. The "zone of influence" is determined as appropriate for the parameter of concern, the characteristics of the receiving water body (e.g., lake versus river, etc.), and other relevant factors. Where available, a Total Maximum Daily Load analysis or other watershed-scale plan will be the basis for identifying the appropriate zone of influence. The department may conclude that such compliance has not been achieved where existing sources are violating their NPDES permit limits. However, the existence of a compliance schedule in the NPDES permit may be taken into consideration in such cases. Required controls on existing regulated sources need not be finally achieved prior to authorizing a proposed activity provided there is reasonable assurance of future compliance.

Procedures for Category 2 Waters

Regulated activities that result in a permanent or temporary, new or expanded source of pollution to this category of water are permitted if the following conditions are met:

1) The classified uses of the water would be maintained.

2) The assimilative capacity of the water is available for the parameters that would be affected by the regulated activity, and existing uses would be protected as discussed in Section II.

A decision will be made on a case-by-case basis, using available data and best professional judgment. The applicant may be required to provide additional information necessary for the department to characterize or otherwise predict changes to the physical, chemical, and/or biological condition of the water.

Procedures for Category 3 Waters
Outstanding State Resource Waters – Eligibility

Outstanding state resource waters may be designated Category 3 waters only after they have been determined to have exceptional value for present or prospective future use for public water supplies, propagation of fish or aquatic life, wildlife, recreational purposes, or agricultural, industrial, or other legitimate beneficial uses. The factors that may be considered in determining whether a water body is eligible for inclusion in Category 3 include the following:

1) location,

2) previous special designations,

3) existing water quality,

4) physical characteristics,

5) ecological value, and

6) recreational value.

Nomination. Any person may nominate any waters of the state for designation as outstanding state resource waters. The nomination must be made in writing to the department, must describe its specific location and present uses, and must state the reasons why the resource has exceptional value for present or prospective future beneficial use.

Review Process. The department with cooperation of the State Water Commission shall review any nomination to determine whether the nominated waters of the state are eligible, clearly defined, and identify beneficial uses of exceptional value for present or prospective future use. The Health Department with cooperation of the State Water Commission shall provide as a part of their assessment:

1) a verification of the uses, properties, and/or attributes that define the proposed "exceptional" value;

2) an evaluation of the current and historical condition of the water with respect to the proposed value using the best data available;

3) an estimate of likely regulatory measures needed to achieve the desired level of protection.

If the identified waters of the state are eligible, clearly defined, and appear to identify beneficial uses of exceptional value for present or prospective future use, the Water Pollution Control Board, the department, and the State Water Commission will solicit public comment and/or hold a public hearing regarding the nomination. The Water Pollution Control Board will review the application record and the public comments, and make a recommendation to the department. After reviewing the Board's recommendation, the department jointly with the State Water Commission will make a decision on whether to designate the defined water body as an Outstanding State Water Resource. If both the department and the State Water commission agree that the defined water body should be designated as an Outstanding State Water Resource, the department shall submit the recommendation to the State Health Council as part of the water quality standard revision process. The designation, if made, may be reviewed on a periodic basis.

Implementation Process. Effects on Category 3 waters resulting from regulated activity will be determined by appropriate evaluation and assessment techniques and best professional judgment. Any proposed regulated activity that would result in a new or expanded source of pollutants to a segment located in or upstream of a Category 3 segment will be allowed only if there are appropriate restrictions to maintain and protect existing water quality. Reductions in water quality may be allowed only if they are temporary and negligible. Factors that may be considered in judging whether the quality of a Category 3 water would be affected include:

1) percent change in ambient concentrations predicted at the appropriate critical condition(s);

2) percent change in loadings;

3) percent reduction in available assimilative capacity;

4) nature, persistence, and potential effects of the parameter;

5) potential for cumulative effects, and

6) degree of confidence in any modeling techniques utilized.

V) Latest Antidegradation News

None

South Dakota

I) Antidegradation Policy Contacts

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II) Antidegradation Policy

The Antidegradation Policy is contained in the Surface Water Quality Standards, ARSD 74:51:01, available online at http://legis.state.sd.us/rules/rules/7451.htm.

The antidegradation policy for this state is as follows:

1) The existing beneficial uses of surface waters of the state and the level of water quality that is assigned by designated beneficial uses shall be maintained and protected;

2) Surface waters of the state in which the existing water quality is better than the minimum levels prescribed by the designated beneficial use shall be maintained and protected at that higher quality level;

3) The board, or secretary, may allow a lowering of the water quality to levels established under the designated beneficial use if it is necessary in order to accommodate important economic or social development in the area in which the waters are located;

4) Surface waters of the state which do not meet the levels of water quality assigned to the designated beneficial use shall be improved as feasible to meet those levels;

5) No further reduction of water quality may be allowed for surface waters of the state that do not meet the water quality levels assigned to their designated beneficial uses as a result of natural causes or conditions, and all new discharges must meet applicable water quality standards; and

6) The secretary shall assure that regulatory requirements are achieved for all new and existing point sources and that nonpoint sources are controlled through cost effective and reasonable best management practices.

III) Antidegradation Implementation Procedures

Antidegradation of Water Quality Review for Existing Point Source Discharges to Waters of the State.

All surface water discharge permits, at the time of renewal, shall undergo an antidegradation of water quality review by the secretary unless any one of the following situations applies:

1) The existing facility is operating at or below design flows and pollutant loadings;

2) The existing effluent quality is in compliance with all of the discharge permit limits;

3) The existing discharge permittee was discharging to the current stream segment prior to March 27, 1973, and the quality and quantity of the discharge has not degraded the water quality of that segment as it existed on March 27, 1973;

4) The existing discharge permittee, with department approval, has upgraded or built new wastewater treatment facilities between March 27, 1973, and July 1, 1988; or

5) The existing discharge permittee discharges to a receiving water assigned only the beneficial uses of fish and wildlife propagation, recreation, and stock watering and irrigation and the discharge is not expected to contain toxic pollutants in concentrations that may cause an impact to the receiving stream. This exemption does not apply to discharges that will cause any adverse impacts to downstream segments that are of higher quality.

Antidegradation of Water Quality Review for New, Potential Point Source Discharges to Waters of the State.

New surface water discharge permit applications shall undergo an antidegradation of water quality review by the secretary prior to permit issuance. New surface water discharge permit applications are exempt from this section if the receiving water for the discharge is assigned only the beneficial uses of fish and wildlife propagation, recreation, and stock watering and irrigation and the discharge will not cause any adverse impacts to any downstream segment classified as a higher designated use.

Antidegradation Review Public Notice Requirements.

For any discharge for which an antidegradation review is required by this chapter, the secretary shall allow for intergovernmental coordination and public participation by providing a public notice of the secretary's recommendation and findings in a daily or weekly newspaper which serves the affected area. The public notice shall follow the requirements of § 74:52:05:13. If a petition in accordance with chapter 74:50:02 contesting the secretary's recommendation is received by the department, a contested case hearing shall be held before the board. If the recommendation is not contested, that recommendation shall become the final determination on the review.

Antidegradation of Water Quality Review for Nonpoint Source Discharges to Waters of the State.

Nonpoint sources shall be reviewed as feasible by the board. Nonpoint source discharges shall be controlled utilizing cost-effective methods and reasonable best management practices.

IV) Water Designations

The beneficial use classifications of surface waters of the state established in this section do not limit the actual use of such waters. The classifications designate the minimum quality at which the surface waters of the state are to be maintained and protected. The following are the beneficial use classifications:

1) Domestic water supply waters;
2) Coldwater permanent fish life propagation waters;
3) Coldwater marginal fish life propagation waters;
4) Warmwater permanent fish life propagation waters;
5) Warmwater semipermanent fish life propagation waters;
6) Warmwater marginal fish life propagation waters;
7) Immersion recreation waters;
8) Limited contact recreation waters;
9) Fish and wildlife propagation, recreation, and stock watering waters;
10) Irrigation waters; and
11) Commerce and industry waters.

Outstanding state resource waters. Surface waters of the state that are of high quality or are of exceptional recreational or ecological significance may be designated by the board as outstanding state resource waters. If high quality waters constitute an outstanding state resource water, that water quality shall be maintained and protected. Anyone wishing to nominate outstanding state resource waters shall follow petition requirements outlined in SDCL 1-26-13.

V) Latest Antidegradation News

None

Utah

I) Antidegradation Policy Contacts

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II) Antidegradation Policy

Rules are located in the Water Quality Standards at: http://www.waterquality.utah.gov. Click on "Publications and Rules," then on "HTML (onscreen)," then on "R317-2 Standards of Quality for Waters of the State."

3.1 Maintenance of Water Quality

Waters whose existing quality is better than the established standards for the designated uses will be maintained at high quality unless it is determined by the Board, after appropriate intergovernmental coordination and public participation in concert with the Utah continuing planning process, allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. However, existing instream water uses shall be maintained and protected. No water quality degradation is allowable which would interfere with or become injurious to existing instream water uses. In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Federal Clean Water Act.

3.2 High Quality Waters -- Category 1

Waters of high quality which have been determined by the Board to be of exceptional recreational or ecological significance or have been determined to be a State or National resource requiring protection, shall be maintained at existing high quality through designation, by the Board after public hearing, as High Quality Waters -- Category 1. New point source discharges of wastewater, treated or otherwise, are prohibited in such segments after the effective date of designation. Protection of such segments from pathogens in diffuse, underground sources is covered in R317-5 and R317-7 and the Regulations for Individual Wastewater Disposal Systems (R317-501 through R317-515). Other diffuse sources (nonpoint sources) of wastes shall be controlled to the extent feasible through implementation of best management practices or regulatory programs.

Projects such as, but not limited to, construction of dams or roads will be considered where pollution will result only during the actual construction activity, and where best management practices will be employed to minimize pollution effects.

Waters of the state designated as High Quality Waters -- Category 1 are listed below.

3.3 High Quality Waters -- Category 2

High Quality Waters -- Category 2 are designated surface water segments which are treated as High Quality Waters -- Category 1 except that a point source discharge may be permitted provided that the discharge does not degrade existing water quality. Waters of the state designated as High Quality Waters -- Category 2 are listed in R317-2-12.2.

3.4 High Quality Waters - Category 3

High Quality Waters-Category 3 are designated surface water segments where a point source discharge may be permitted under the conditions and following the review outlined in this section. The High Quality Waters Category 3 designation may be applied to waters with quality higher than that necessary to support the designated beneficial uses of those waters.

Drinking water sources or waters with special value for recreation or fisheries are candidates to be designated as High Quality Waters - Category 3. Before new point source discharges, or increases to existing point source discharges, may be allowed, the State shall assure that

1) there shall be achieved all statutory and regulatory requirements for all new and existing point sources and there shall be achieved all required cost-effective and reasonable best management practices for nonpoint source control in the immediate area of the discharge,

2) there are no reasonable non-degrading or less degrading alternatives to the discharge (based on information provided by the discharger),

3) the proposed activity has economic and social importance, and

4) water quality standards will not be violated by the discharge.

In addition, depending upon the location of the discharge and its proximity to downstream drinking water diversions, additional treatment or more stringent effluent limits or additional monitoring, beyond that which may otherwise be required to meet minimum technology standards or instream water quality standards, may be required in order to adequately protect public health and the environment. Such additional treatment may include additional disinfection, suspended solids removal to make the disinfection process more effective, and/or nutrient removal to reduce the organic content of raw water used as a source for domestic water systems. Additional monitoring may include analyses for viruses, cryptosporidium, or other pathogenic organisms. The additional treatment/effluent limits/monitoring which may be required will be determined in consultation with the Division of Drinking Water and the downstream drinking water users.

The review required by this section may be waived by the Executive Secretary where the volume of the discharge is small compared to the flow of the receiving stream. In general, this waiver would be considered where the ratio of the average stream flow to the discharged flow is expected to be greater than 100:1, and the ratio of the 7Q10 (7 day-10 year) low flow to the discharge flow is expected to be greater than 25:1 where

the increase in concentration of pollutants in the stream at 7Q10 is low flow is expected to be less than 10%, or based on other site specific criteria.

Waters of the state designated as High Quality Waters -- Category 3 are listed in R317-2-12.2.

III) Antidegradation Implementation Procedures

Implementation Procedures are located at:
http://www.waterquality.utah.gov/public notices/wqs_revision_5-2003.htm

IV) Water Designations

List of designated Tier III Waters
There is a list of high quality waters for which special protection is provided. These waters are not called Tier III. They are listed below and in Utah's water quality standards. They are called High Quality Waters - Category 1 and High Quality Waters - Category 2.

River Network note:

> High Quality Waters - Category 1 receive the following protection, "Waters of high quality which have been determined by the Board to be of exceptional recreational or ecological significance or have been determined to be a State or National resource requiring protection, shall be maintained at existing high quality through designation, by the Board after public hearing, as High Quality Waters - Category 1. New point source discharges of wastewater, treated or otherwise, are prohibited in such segments after the effective date of designation." High Quality Waters - Category 2 are effectively Tier II ½ waters, with implementation language as follows: "High Quality Waters - Category 2 are designated surface water segments which are treated as High Quality Waters - Category 1 except that a point source discharge may be permitted provided that the discharge does not degrade existing water quality."

Utah's High Quality Waters:

High Quality Waters - Category 1
All surface waters geographically located within the outer boundaries of U.S. National Forests whether on public or private lands ***with the following exceptions***:

All High Quality Waters - Category 2 as listed in R317-2-12.2.

- Weber River, a tributary to the Great Salt Lake, in the Weber River Drainage from Uintah to Mountain Green.

Other surface waters, which may include segments within U.S. National Forests as follows:

Colorado River Drainage

- Calf Creek and tributaries, from confluence with Escalante River to headwaters.
- Sand Creek and tributaries, from confluence with Escalante River to headwaters.
- Mamie Creek and tributaries, from confluence with Escalante River to headwaters.
- Deer Creek and tributaries, from confluence with Boulder Creek to headwaters (Garfield County).
- Indian Creek and tributaries, through Newspaper Rock State Park to headwaters.

Green River Drainage

- Fish Creek from confluence with White River to Scofield Dam.
- Range Creek and tributaries, from confluence with Green River to headwaters.
- Strawberry River and tributaries, from confluence with Red Creek to headwaters.
- Avintaquin Creek, from confluence with Strawberry River to confluence with Cottonwood Creek.
- Ashley Creek and tributaries, from Steinaker diversion to headwaters.
- Jones Hole Creek and tributaries, from confluence with Green River to headwaters.
- Green River, from state line to Flaming Gorge Dam.
- Tollivers Creek, from confluence with Green River to headwaters.
- Allen Creek, from confluence with Green River to headwaters.

Virgin River Drainage

- North Fork Virgin River and tributaries, from confluence with East Fork Virgin River to headwaters.
- East Fork Virgin River and tributaries from confluence with North Fork Virgin River to headwaters.
- 12.1.2.4 Kanab Creek Drainage
- Kanab Creek and tributaries, from irrigation diversion at confluence with Reservoir Canyon to headwaters.

Bear River Drainage

- Swan Creek and tributaries, from Bear Lake to headwaters.

- North Eden Creek, from Upper North Eden Reservoir to headwaters.
- Big Creek and tributaries, from Big Ditch diversion to headwaters.
- Woodruff Creek and tributaries, from Woodruff diversion to headwaters.

Weber River Drainage

- Burch Creek and tributaries, from Harrison Boulevard in Ogden to headwaters.
- Hardscrabble Creek and tributaries, from confluence with East Canyon Creek to headwaters.
- Chalk Creek and tributaries, from U.S. Highway 189 to headwaters.
- Weber River and tributaries, from U.S. Highway 189 near Oakley to headwaters.

Jordan River Drainage

- City Creek and tributaries, from City Creek Water Treatment Plant to headwaters (Salt Lake County).
- Emigration Creek and tributaries, from Hogle Zoo to headwaters (Salt Lake County).
- Red Butte Creek and tributaries, from Foothill Boulevard in Salt Lake City to headwaters.
- Parley's Creek and tributaries, from 13th East in Salt Lake City to headwaters.
- Mill Creek and tributaries, from Wasatch Boulevard in Salt Lake City to headwaters.
- Big Cottonwood Creek and tributaries, from Wasatch Boulevard in Salt Lake City to headwaters.
- Little Willow Creek and tributaries, from diversion to headwaters (Salt Lake County.)
- Bell Canyon Creek and tributaries, from Lower Bells Canyon Reservoir to headwaters (Salt Lake County).
- South Fork of Dry Creek and tributaries, from Draper Irrigation Company diversion to headwaters (Salt Lake County).

Provo River Drainage

- Upper Falls drainage above Provo City diversion (Utah County).
- Bridal Veil Falls drainage above Provo City diversion (Utah County).

- Lost Creek and tributaries, above Provo City diversion (Utah County).

Sevier River Drainage

- Chicken Creek and tributaries, from diversion at canyon mouth to headwaters.
- Pigeon Creek and tributaries, from diversion to headwaters.
- East Fork of Sevier River and tributaries, from Kingston diversion to headwaters.
- Parowan Creek and tributaries, from Parowan City to headwaters.
- Summit Creek and tributaries, from Summit City to headwaters.
- Braffits Creek and tributaries, from canyon mouth to headwaters.
- Right Hand Creek and tributaries, from confluence with Coal Creek to headwaters.

Raft River Drainage

- Clear Creek and tributaries, from state line to headwaters (Box Elder County).
- Birch Creek (Box Elder County), from state line to headwaters.
- Cotton Thomas Creek from confluence with South Junction Creek to headwaters.

Western Great Salt Lake Drainage

- All streams on the south slope of the Raft River Mountains above 7000' mean sea level.
- Donner Creek (Box Elder County), from irrigation diversion to Utah-Nevada state line.
- Bettridge Creek (Box Elder County), from irrigation diversion to Utah-Nevada state line.
- Clover Creek, from diversion to headwaters.

- All surface waters on public land on the Deep Creek Mountains.

Farmington Bay Drainage

- Holmes Creek and tributaries, from Highway US-89 to headwaters (Davis County).
- Shepard Creek and tributaries, from Height Bench diversion to headwaters (Davis County).

- Farmington Creek and tributaries, from Height Bench Canal diversion to headwaters (Davis County).

- Steed Creek and tributaries, from Highway US-89 to headwaters (Davis County).

High Quality Waters - Category 2
In addition to assigned use classes, the following surface waters of the State are hereby designated as High Quality Waters - Category 2:

Green River Drainage

- Deer Creek, a tributary of Huntington Creek, from the forest boundary to 4800 feet upstream

Tier II ½ Classification (designated waters, policy, regulations, and/or implementation procedures)
Tier II ½ might be analogous to our High Quality Waters - Category 3 designation which relates primarily to drinking water sources and provides for extra evaluation of new point source discharges into these waters. There is currently only one stream segment on this list.

Tiers I and II Formally Designated
None formally designated

V) Latest Antidegradation News

None

Wyoming

I) Antidegradation Policy Contacts

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II) Antidegradation Policy

Section 8 of Quality Standards for Wyoming Surface Waters (Water Quality Division Rules and Regulations, Chapter 1) establishes a regulatory policy concerning antidegradation. That regulation provides...

1) Water uses in existence on or after November 28, 1975 and the level of water quality necessary to protect those uses shall be maintained and protected. Those surface waters not designated as Class 1, but whose quality is better than the standards contained in these regulations, shall be maintained at that higher quality. However, after full intergovernmental coordination and public participation, the Wyoming Department of Environmental Quality may issue a permit for or allow any project or development which would constitute a new source of pollution, or an increased source of pollution, to these waters as long as the following conditions are met:

    a) The quality is not lowered below these standards;

    b) All existing water uses are fully maintained and protected;

    c) The highest statutory and regulatory requirements for all new and existing point sources and all cost effective and reasonable best management practices for nonpoint sources have been achieved; and

    d) The lowered water quality is necessary to accommodate important economic or social development in the area in which the waters are located.

2) The administrator may require an applicant to submit additional information, including but not limited to an analysis of alternatives to any proposed discharge and relevant economic information before making a determination under this section.

3) The procedures used to implement this section are described in the "Antidegradation Implementation Policy." Antidegradation protection is one of the essential elements of the state water quality standards program and is required under Section 303(d)(4)(B) of the federal Clean Water Act. The purpose of this implementation

procedure is to disclose the decision-making and public participation processes that will be employed by the Water Quality Division in order to ensure compliance with the requirements of Section 8.

A secondary purpose of this implementation plan is to ensure federal approval of the State's surface water quality standards. Though the State has the primary authority to establish standards, the U.S. EPA has a responsibility to make a determination of whether such standards will achieve the goals and requirements of the federal Act. To a large extent, approval of the standards relies upon approval of an antidegradation implementation procedure.

Wyoming has adopted essentially the same language that is in the federal regulations at 40 CFR Part 131.12 into the state regulations (Chapter 1, Section 8). Implementation of the Antidegradation Policy is covered by an agency policy rather than an adopted rule triennial review.

III) Antidegradation Implementation Procedures

The water quality standards designate the uses which are protected on waters of the state and establish criteria that describe maximum pollutant concentrations and other water quality conditions that are necessary to maintain those uses. Many waters in the state have an existing level of water quality that is better than the criteria established to support designated uses. The antidegradation requirements are designed to maintain water quality at the higher levels unless there are good reasons for lowering the water quality.

The federal regulations (40 CFR 131.12) require state standards programs to address 3 levels or "tiers" of antidegradation protection:

"Tier 1" is the basic level of protection which applies to all waters. Waters which are afforded tier 1 protection only are waters not generally considered to be high quality, or are not currently supporting designated uses, or where assimilative capacity does not exist for parameters that would be affected by a proposed activity.

"Tier 2" protections apply to high quality waters. These are waters which have an existing quality that is better than the established use-support criteria and where an assimilative capacity exists for parameters that would be affected by a proposed activity. Under tier 2, a lowering of water quality may be allowed if it is determined that the amount of degradation is insignificant or if the lowered water quality is necessary to accommodate important economic or social development in the area. Under no circumstances, however, may water quality be lowered below the criteria established in the standards or below a level that would impair an existing use.

"Tier 3" protections apply to waters that constitute "outstanding national resource waters"(ONRWs)1. Tier 3 requires maintenance of existing quality with no consideration of assimilative capacity or economic or social development. In certain circumstances, temporary lowering of water quality is allowable, however the general rule is that no new point sources or increased pollutant loading from existing point sources is allowable.

The antidegradation implementation procedures that follow shall apply to the review of regulated activities involving new or increased discharges of pollution. Regulated activities include individual NPDES effluent discharge permits, NPDES stormwater permits for industrial and construction activities and Section 401 water quality certifications. The procedure is organized starting with the highest level of protection applied to Class 1 waters to the basic minimum level applicable to all waters.

The Wyoming water quality protection program has no provision for designating waters that have "national" significance, however, waters designated as Class 1 under the surface water standards are considered to be outstanding resources. Though not designated as ONRWs, Class 1 waters are afforded a level of antidegradation protection which is a functional equivalent of EPA's tier 3 concept.

High Quality Waters - Classes 2AB, 2A, 2B and 2C

The antidegradation procedure under this part applies to the issuance of NPDES Effluent Permits, Stormwater Permits *(Industrial & Construction Activities)* and Section 401 Certifications of Activities Regulated by the Federal Energy Regulatory Commission (FERC). Waters classified as 2AB, 2A, 2B or 2C are known to support populations of fish and/or drinking water supplies and are considered to be high quality waters. The Water Quality Division may issue a permit or certification for new or increased discharges to these waters upon making a finding that the amount of resultant degradation is insignificant or that the discharge is necessary to accommodate important economic or social development in the area where the waters are located.

The Department must also ensure that the highest statutory and regulatory requirements for all new and existing point sources and all cost effective and reasonable best management practices for nonpoint sources have been achieved. For purposes of antidegradation implementation these may be referred to as "reviewable waters".

Where there are existing regulated point or nonpoint sources located in the area, the Water Quality Division will ensure that compliance with the required controls has been or will be achieved prior to authorizing the proposed regulated activity. This requirement is primarily intended to ensure that proposed activities that will result in water quality degradation for a particular parameter will not be authorized where there are existing unresolved compliance problems involving the same parameter in the zone of influence of the proposed activity. The "zone of influence" is determined as appropriate for the parameter of concern, the characteristics of the receiving water (e.g. lake versus river, etc.), and other relevant factors. Where available, a Total Maximum Daily Load (TMDL) analysis or other watershed-scale plan will be the basis for identifying the appropriate zone of influence. The Division may conclude that such compliance has not been assured where existing sources are violating their NPDES permit requirements. However, the existence of schedules of compliance for purposes of NPDES permit requirements may be taken into consideration in such cases. In other words, required controls on existing regulated sources need not be finally achieved prior to authorizing a proposed activity provided there is reasonable assurance of future compliance.

The antidegradation review under this part consists of three sequential evaluations: 1.Determination of significance; 2. Economic evaluation; and 3. Examination of alternatives.

1) Determination of Significance:

Based upon information submitted in an application for a water quality permit or certification, the Administrator shall make a determination of whether the proposed discharge will result in a significant lowering of water quality with respect to adopted numeric water quality criteria. The significance determination will be based on the chronic numeric standard and flow for the pollutant of concern except for those pollutants which have only acute numeric standards in which case the acute standard and flow will be used. This significance determination shall be made with respect to the net effect of the new or increased water quality impacts of the proposed activity, taking into account any environmental benefits resulting from the activity and any water quality-enhancing mitigation measures impacting the segment or segments under review, if such measures are incorporated with the proposed activity. The activity shall be considered not to result in significant degradation, if:

a) The activity may be permitted under a general permit established by the state for discharges regulated under section 402 or by the Corps of Engineers for discharges regulated under Section 404 of the Clean Water Act; or

b) The new or increased loading from the source under review is less than 10 percent of the existing total load to that segment for critical constituents (e.g. those for which there are stream standards set and which are present in the discharge); provided, that the cumulative impact of increased loadings from all sources does not exceed 10 percent of the baseline total load established for the segment (the baseline total load shall be determined at the time of the first proposed new or increased water quality impacts to the reviewable waters.); or

c) The new or increased loading from the source under review will consume, after mixing, less than 20 percent of the available increment between low flow pollutant concentrations and the relevant standards (assimilative capacity), for critical constituents; or

d) The activity will result in only temporary or short term changes in water quality.

   i) If an activity is considered not to result in significant degradation, no further review will be conducted. General NPDES permits and 401 certifications of general 404 permits will be issued at this point. In the case of individual permits, the Water Quality Division shall prepare a draft permit and provide opportunity for public comment before the NPDES permit is issued. Such public notices shall contain a statement describing the rationale for the determination of non-significance. If the permit is issued, the determination may be appealed to the Environmental Quality Council under the provisions of the Wyoming Administrative Procedures Act.

   ii) If a determination is made that a proposed activity is likely to result in significant degradation of reviewable waters, an evaluation shall be made as to whether the degradation is necessary to accommodate important economic or social development in the area in which the waters are located.

2) Economic Evaluation: The following provisions shall apply to this determination:

a) The "area in which the waters are located" shall be determined from the facts on a case-by-case basis. The area shall include all areas directly impacted by the proposed activity.

b) A determination shall be made on the facts on a case-by-case basis whether the proposed activity is important economic or social development. If the applicant submits evidence that the activity is important development, it shall be presumed important unless information to the contrary is submitted in the public review process. The determination shall take into account information received during the public comment period and shall give substantial weight to any applicable determinations by local governments or land use planning authorities.

c) If the proposed activity is determined not to be important for economic or social development, authorization for the associated discharge(s) will be denied.

d) If the proposed activity is determined to be important economic or social development, a determination shall be made whether the degradation that would result from such activity is necessary to accommodate that development.

3) Examination of Alternatives. The degradation shall be considered acceptable if there are no other water quality control alternatives available that:

a) would result in no degradation or less degradation of the state waters; and

b) are determined to be economically, environmentally, and technologically reasonable.

c) This determination of whether such alternatives are available, shall be based upon a reasonable level of analysis by the project proponent, consistent with accepted engineering practice, and any information submitted by the public or which is otherwise available to the Administrator. The assessment shall at a minimum, address practical water quality control technologies, the feasibility and availability of which has been demonstrated under field conditions similar to those of the activity under review. The scope of alternatives considered shall be limited to those that would accomplish the proposed activity's purpose.

d) In determining the economic reasonableness of water quality control alternatives, the Administrator may use some of the following factors to weigh the reasonableness of the various alternatives.

i) Whether the costs of the alternative significantly exceed the costs of the proposal;

ii) For publicly owned treatment works (POTWs), whether user charges resulting from the alternative would significantly exceed user charges for similarly situated POTWs or public water supply projects;

iii) For any discharger into waters of the state, whether the treatment alternative represents costs that significantly exceed costs for other similar dischargers to similar stream classes, or standard industry practices.

iv) Any other environmental benefits, unrelated to water quality which may result from each of the alternatives examined.

e) Upon conclusion of the alternatives analysis, the Administrator shall select a preferred alternative and prepare a draft permit and public notice proposing to authorize the selected alternative. The selected alternative shall be the least degrading, reasonable alternative consistent with the social and economic benefits. The public notice shall contain a statement describing the results of the antidegradation review. If the permit is issued, all administrative decisions relating to the antidegradation review or permit issuance may be appealed to the Environmental Quality Council under the provisions of the Wyoming Administrative Procedures Act. B. Section 401 Certification Individual Section 404 Permits Issued by the U.S. Army Corps of Engineers. Activities involving a discharge of dredged or fill materials that are considered to have more than minor adverse affects on the aquatic environment are regulated by individual Section 404 Permits. The decision making process relative to the 404 permitting program are contained in the 404(b)(1) guidelines *(40 CFR Part 230)*. Prior to issuing a permit under the 404(b)(1) guidelines, the Corps of Engineers must:

i) make a determination that the proposed discharges are unavoidable *(i.e. necessary*);

ii) examine alternatives to the proposed activity and authorize only the least damaging practicable alternative; and

iii) require mitigation for all impacts associated with the activity. A 404(b)(1) findings document is produced as a result of this procedure and is the basis for the permit decision. Public participation is also provided for in this process.

Because the 404(b)(1) guidelines contain all of the required elements of an antidegradation review, the department will not conduct a separate review for the same activity. Section 401 certifications of individual 404 permits will rely upon the information contained in the 404(b)(1) findings document.

Use Protected Waters - Classes 3 *(all)*, and 4 *(all)*

In general, Class 3 and 4 waters do not warrant the special protection provided on high quality waters and shall be afforded a basic level of antidegradation protection (EPA tier equivalent). This level of protection is focused on maintaining existing uses and may allow lowering water quality so long as the established criteria for any parameter is not exceeded.

The issuance of water quality permits and certifications shall not normally involve an examination of economic necessity or alternatives to the proposed activity, however, the administrator may determine on a case-by-case basis that special circumstances exist in relation to a proposed discharge and conduct a tier 2-type review prior to authorizing the activity. Special circumstances may include but are not limited to exceptional recreational or ecological significance (e.g. location in a park or urban greenway, presence of rare or sensitive plant and animal species, contains unique aquatic features such as wetland fens or geothermal springs etc.).

Existing Use Protection for All Wyoming Surface Waters

Except for the special considerations provided in Chapter 1 of the Wyoming Water Quality Rules and regulations regarding Class 4C waters, existing in-stream water uses shall be maintained and protected in all Wyoming surface waters. For Class 1 waters, existing uses will be protected by implementing the requirements described in Section III of this implementation policy. For High Quality and Use Protected Waters, this implementation policy assumes that attainment of the criteria assigned to protect the current waterbody classification will serve to maintain and protect all existing uses. In some cases, however, water quality may have improved in the segment since the classifications were assigned, resulting in an existing use that is higher than the current classification. In other cases, the classifications may have been assigned based on inadequate information, resulting in classifications that do not fully encompass the existing uses of the segment. Where the antidegradation review results in the identification of an existing use that has protection requirements that are clearly defined, but are not addressed in the current classification and criteria, the Division will ensure that such existing uses are fully protected, based on implementation of appropriate numeric or narrative water quality criteria or criteria guidance. For example, where a proposed activity will result in the discharge of a substance for which sufficient data to derive appropriate criteria are available (e.g. §304(a) criteria), but numeric criteria have not been adopted in the Chapter 1 regulations, the Division will develop effluent limitations that will protect the existing use. In cases where there is a proposed discharge where federally-listed threatened or endangered species are present (i.e. aquatic species), the Division will work with the U.S. Fish and Wildlife Service and EPA to gather available information and evaluate whether special existing use protection requirements are necessary to protect the listed species. Where there is a question regarding the appropriate classification of a segment, the applicant may be required to provide information regarding existing uses.

IV) Water Designations

List of designated Tier III Waters
They are listed below and in Appendix A of Chapter 1 of the Water Quality Rules and Regulations. They are not identified as "Tier III Waters" in the rules, but are referred to as Class 1 waters. Waters in this classification receive a full Tier III type of protection but are not considered by the State to be "Outstanding National Resource Waters" (ONRWs). EPA's concept of ONRW has no real meaning in the state regulations.

Wyoming's Class 1 Waters:

- All surface waters located within the boundaries of national parks and congressionally designated wilderness areas as of January 1, 1999
- The main stem of the Snake River through its entire length above the U.S. Highway 22 Bridge (Wilson Bridge)
- The main stem of the Green River, including the Green River Lakes from the mouth of the New Fork River upstream to the wilderness boundary

- The Main Stem of the Wind River from the Wedding of the Waters upstream to Boysen Dam
- The main stem of the North Platte River from the mouth of Sage Creek (approximately 15 stream miles downstream of Saratoga, Wyoming) upstream to the Colorado state line
- The main stem of the North Platte River from the headwaters of Pathfinder Reservoir upstream to Kortes Dam (Miracle Mile segment)
- The main stem of the North Platte River from the Natrona County Road 309 bridge (Goose Egg bridge) upstream to Alcova Reservoir
- The main stem of Sand Creek above the U.S. Highway 14 bridge
- The main stem of the Middle Fork of the Powder River through its entire length above the mouth of Buffalo Creek
- The main stem of the Tongue River, the main stem of the North Fork of the Tongue River, and the main stem of the South Fork of the Tongue River above the U.S. Forest Service Boundary
- The main stem of the Sweetwater River above the mouth of Alkali Creek
- The main stem of the Encampment River from the northern U.S. Forest Service boundary upstream to the Colorado state line
- The main stem of the Clarks Fork River from the U.S. Forest Service boundary upstream to the Montana state line
- All waters within the Fish Creek (near Wilson, Wyoming) drainage
- The main stem of Granite Creek (tributary of the Hoback River) through its entire length;
- Fremont Lake
- Wetlands adjacent to the above listed Class 1 waters
- National Parks and Wilderness Areas. All surface waters located within the boundaries of Yellowstone and Grand Teton National Parks and congressionally designated wilderness areas as of January 1, 1999 are Class 1 waters. Such Class 1 designation always takes precedence over the classification given in the listing. For example, Dinwoody Creek is shown as a Class 2 water; however, the upper portions are within a wilderness area and those portions are Class 1. The portion below the wilderness boundary is Class 2.

Tier II ½ Classification (designated waters, policy, regulations, and/or implementation procedures)
No separate Tier II 1/2 designation in the state program.

Tiers I and II Formally Designated

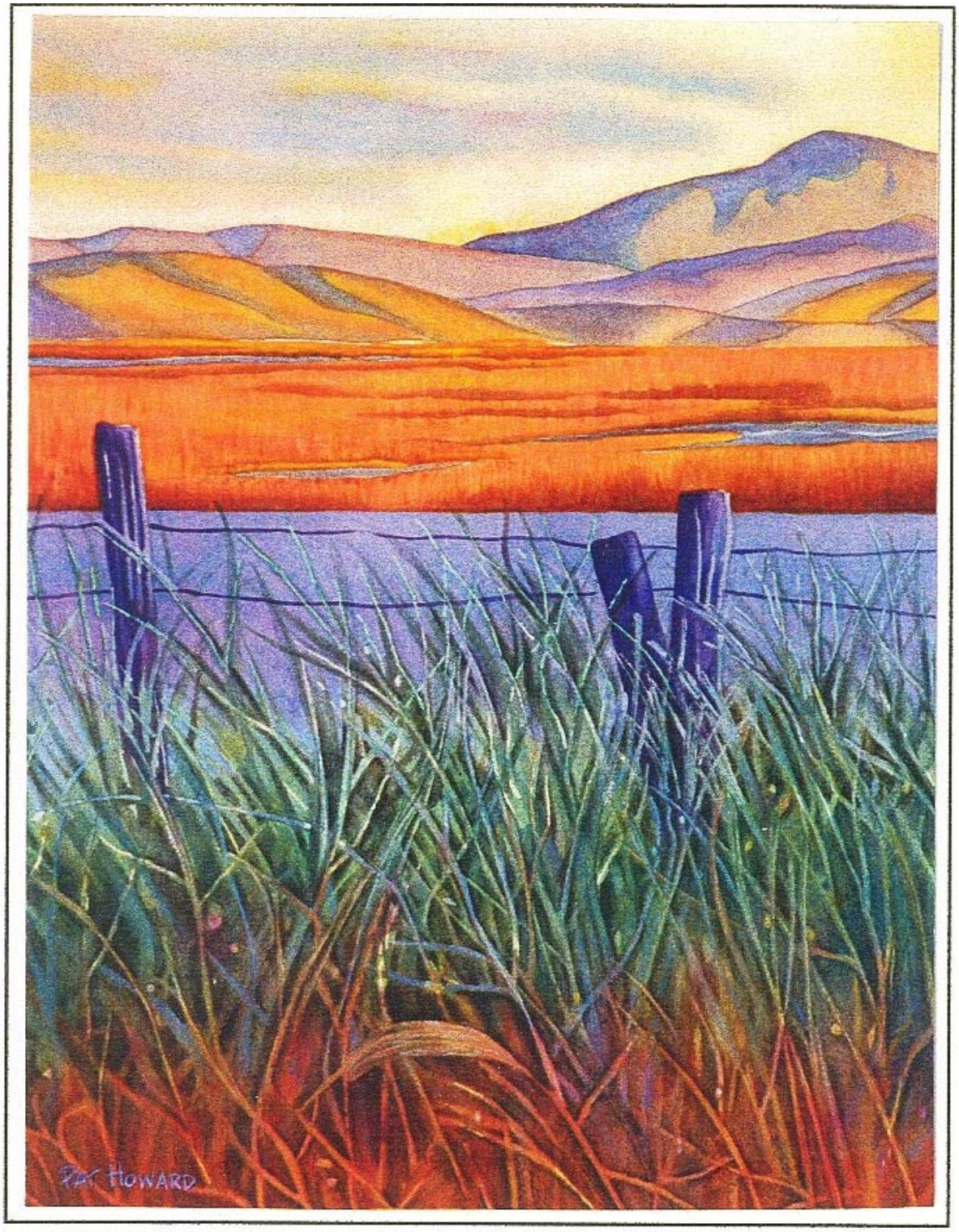
Waters receive either Tier I or Tier II protections depending upon their use classifications. In the current rules antidegradation is as follows:
Class 1 Waters - Tier III protection
Class 2 Waters - Tier II protection
Class 3 & 4 Waters - Tier I protection

V) Latest Antidegradation News

10/4/2001 The Environmental Quality Council voted to adopt revised water quality standards. Wyoming is awaiting approval from EPA Region VIII. Changes to the WQS include the adoption of an antidegradation policy that follows Region VIII's Gold Book model. Coalbed methane threats have been driving this process.

For more information:
Contact Dan Helig, Wyoming Outdoor Council.
http://www.wyomingoutdoorcouncil.org/

Treatment of Wetlands



Colorado's Treatment of Wetlands

I) Summary

Colorado has definitions for wetlands within its water quality standards. Surface water quality standards are applied to the wetland definitions and some classifications. They are assigned protection within the surface water segment of which they are a part. There are no biocriteria standards.

All the following information has been taken from:

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
WATER QUALITY CONTROL COMMISSION
REGULATION NO. 31
THE BASIC STANDARDS AND METHODOLOGIES FOR SURFACE WATER
(5 CCR 1002-31)
http://www.cdphe.state.co.us/op/regs/waterregs/100231.pdf

II) Water Quality Standards

31.7 PROCESS FOR ASSIGNING STANDARDS AND GRANTING, EXTENDING, OR REMOVING TEMPORARY MODIFICATIONS

(iv) Standards For Surface Waters In Wetlands

(A) Tributary wetlands to which the interim classifications referenced in section 31.13(1)(e)(iv) apply, shall be subject to the following interim standard:

(1) Until such time as the Commission adopts site-specific standards for the tributary wetland, water quality in the wetland shall be maintained for each parameter at whichever of the following levels is less restrictive:

a. ambient quality, or

b. that quality which meets the numeric standards (except for numeric standards for pH, dissolved oxygen, and any standard established for the protection of a domestic water supply use) of the tributaries of the surface water segment to which the wetland is most directly hydrologically connected. Where the applicable numeric standard is based on section 31.16, table III, of this regulation, the numeric standard applicable to the wetland may be implemented taking into account the water effect ratio of the pollutant.

(2) Ambient quality shall be determined in accordance with section 31.7(1)(b)(ii) and shall take into account the location, sampling date, and quality of all available data. Ambient quality shall be determined as of the time the first regulatory action is undertaken which requires the identification of water quality standards for wetlands. If available

information is not adequate to otherwise determine or estimate ambient quality, the interim standard set forth in section 31.7(1) (b) (iv) (A) (1) (b) shall apply.

(B) Wetlands for which the Commission has adopted a site-specific "wetlands" classification described in section 31.13(1)(e)(v), shall be subject to numeric standards and designations adopted by the Commission. The Commission shall adopt any numeric standards and designations determined to be appropriate in view of the functions and values to be protected for the wetlands in question.

(C) Created wetlands, shall be subject only to the narrative standards set forth in section 31.11, unless the Commission has adopted the wetlands classification and appropriate numeric standards. All created wetlands will have a use-protected designation unless determined otherwise as a result of a site-specific hearing.

(D) Compensatory wetlands shall be subject to the standards of the segment in which they are located, unless the Commission adopts a wetlands classification and appropriate numeric standards.

(E) All other wetlands which are state waters shall be subject only to the narrative standards set forth in section 31.11, unless the Commission has adopted the wetlands classification and appropriate numeric standards.

(F) The issuance and use of site-specific or individual permits under section 404 of the Clean Water Act, is not precluded by the provisions of sections 31.7, 31.11 or 31.13, except as provided in the 401 certification process under section 25-8-302, C.R.S.

(G) Wetlands water quality standards and classifications shall not be interpreted or applied in a manner that is inconsistent with sections 25-8-102(5) and 25-8-104, C.R.S.

31.10 MIXING ZONES

(1) Definitions

(f) Stream, Lake, Wetland

For purposes of this regulation, streams will include Waters of the State that flow, regardless of size, and lakes will include Waters of the State that are not flowing, including reservoirs. Wetlands will be treated in the same manner as lakes.

31.11 BASIC STANDARDS APPLICABLE TO SURFACE WATERS OF THE STATE

(b) for surface waters in wetlands;

(i) produce color, odor, changes in pH, or other conditions in such a degree as to create a nuisance or harm water quality dependent functions or impart any undesirable taste to significant edible aquatic species of the wetland; or

(ii) are toxic to humans, animals, plants, or aquatic life of the wetland.

III) Wetland Definition

31.5 DEFINITIONS

To summarize, the result of this set of definitions, as further elaborated below, is as follows:

1) all wetlands that are not constructed wetlands are state waters, and are subject to the narrative standards;

2) all tributary wetlands are initially subject to interim classifications and numeric standards;

3) created wetlands are initially subject only to the narrative standards;

4) compensatory wetlands are subject to the classification and standards of the segment in which they are located; and

5) wetlands that are not tributary wetlands or created wetlands (sometimes referred to generally as isolated wetlands) are also initially subject to the narrative standards.

10) "COMPENSATORY WETLANDS" means wetlands developed for mitigation of adverse impacts to other wetlands (e.g. wetlands developed pursuant to section 404 of the federal Act).

11) "CONSTRUCTED WETLANDS" means those wetlands intentionally designed, constructed and operated for the primary purpose of wastewater or stormwater treatment or environmental remediation provided under CERCLA, RCRA, or section 319 of the federal Act, if (a) such wetlands are constructed on non wetland sites that do not contain surface waters of the state, or (b) such wetlands are constructed on previously existing wetland sites, to the extent that approval or authorization under section 404 of the federal Act has been granted for such construction or it is demonstrated that such approval or authorization is not, or was not, required. This term includes, but is not limited to, constructed swales, ditches, culverts, infiltration devices, catch basins, and sedimentation basins that are part of a wastewater or stormwater treatment system or a system for environmental remediation mandated under CERCLA or RCRA. Compensatory wetlands shall not be considered constructed wetlands. Constructed wetlands are not state waters.

12) "CREATED WETLANDS" means those wetlands other than compensatory wetlands created in areas which would not be wetlands in the absence of human modifications to the environment. Created wetlands include, but are not limited to wetlands created inadvertently by human activities such as mining, channelization of highway runoff, irrigation, and leakage from man-made water conveyance or storage facilities. Wetlands resulting from hydrologic

modifications such as on-channel reservoirs or on-channel diversion structures that expand or extend the reach of adjacent classified state waters are not considered created wetlands.

29) "TRIBUTARY WETLANDS" means wetlands that are the head waters of surface waters or wetlands within the floodplain that are hydrologically connected to surface waters via either surface or ground water flows. The hydrologic connection may be intermittent or seasonal, but must be of sufficient extent and duration to normally reoccur annually. Tributary wetlands do not include constructed or created wetlands.

36) "WETLANDS" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

IV) Wetland Classification

31.13 STATE USE CLASSIFICATIONS

Waters are classified according to the uses for which they are presently suitable or intended to become suitable. In addition to the classifications, one or more of the qualifying designations described in section 31.13(2), may be appended. Classifications may be established for any state surface waters, except that water in ditches and other manmade conveyance structures shall not be classified.

(e) Wetlands

(i) The provisions of this section do not apply to constructed wetlands.

(ii) Compensatory wetlands shall have, as a minimum, the classifications of the segment in which they are located.

(iii) Created wetlands shall be considered to be initially unclassified, and shall be subject only to the narrative standards set forth in section 31.11, unless and until the Commission adopts the "wetlands" classification described below and appropriate numeric standards for such wetlands.

(iv) Tributary wetlands shall be considered tributaries of the surface water segment to which they are most directly connected and shall be subject to interim classifications as follows: such wetlands shall be considered to have the same classifications, except for drinking water supply classifications, as the segment of which they are a part, unless the "wetlands" classification and appropriate site-specific standards have been adopted to protect the water quality dependent functions of the wetlands. Interim numeric standards for these wetlands are described in section 31.7(1)(b)(iv).

(v) The Commission may adopt a "wetlands" classification based on the functions of the wetlands in question. Wetland functions that may warrant site-specific protection include ground water recharge or discharge, flood flow alteration,

sediment stabilization, sediment or other pollutant retention, nutrient removal or transformation, biological diversity or uniqueness, wildlife diversity or abundance, aquatic life diversity or abundance, and recreation.

Because some wetland functions may be mutually exclusive (e.g., wildlife abundance, recreation), the functions to be protected or restored will be determined on a wetland-by-wetland basis, considering natural wetland characteristics and overall benefits to the watershed. The initial adoption of a site-specific wetlands classification and related standards to replace the interim classifications and standards described above shall not be considered a downgrading.

V) Biocriteria Standards

The Commission has decided not to adopt biological criteria as water quality standards for wetlands at this time. Very little is known at present about the structure and function of aquatic communities within wetlands. Concerns that have been raised regarding the lack of standardized, field-tested biological evaluation techniques are much more significant with respect to wetlands than for other surface waters.

VI) Source Consulted

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Montana's Treatment of Wetlands

I) Summary

Montana has its own wetland classifications which are used only for monitoring; they have not been adopted into the states' standards as part of its beneficial uses classification. Montana is also actively developing biocriteria standards for wetlands under the direction of Randy Apfelbeck (see attached). Wetlands are not included in the Numeric Water Quality Standards of the state.

II) Water Quality Standards

See also: Clean Water Act: Montana
NUMERIC WATER QUALITY STANDARDS
CIRCULAR WQB-7
http://www.deq.state.mt.us/wqinfo/Circulars/WQB-7.PDF

III) Wetlands Definition

None

IV) Wetlands Classification

Wetlands are classified using ecoregions and hydrogeomorphology. The wetland classification system was further refined by incorporating water chemistry and the biological component. The wetland classes are delineated as follows:

CLASS 1: Headwater and Dilute Closed Basin Wetlands

CLASS 2: Riparian Wetlands of the Rocky Mountain Intermountain Valley Ecoregions

CLASS 3 Closed Basin Recharge Wetlands

CLASS 4 Riparian Wetlands of the Plains Ecoregion

CLASS 5 Alkali Closed Basin Wetlands

CLASS 6 Saline Wetlands

CLASS 7 Closed Basin Wetlands with Large Watersheds and Inlets

CLASS 8 Ephemeral Wetlands

CLASS 9 Open Lakes of the Plains Ecoregion

CLASS 10 Open Lakes of the Rocky Mountain and Intermountain Valley Ecoregions

* These are wetland classifications for monitoring purposes and have not been adopted into standards as part of the state's overall beneficial use classifications

http://www.deq.state.mt.us/ppa/mdm/Wetlands/classification.asp

The wetland sites in **Class 1** are characterized as either headwater or dilute closed basin sites. The headwater sites were found at elevation greater that 6500 feet being in the Rocky Mountain Ecoregion. These wetlands were characterized as associated with a stream and a large sedge meadow. All of the headwater wetlands were found in the Rocky Mountain Ecoregion. The dilute closed basin sites within this class have no visible surface outflows. Vegetation for the closed basin sites often has lily pads, sedge, willow or bog birch. Amphibians such as frogs, tadpoles and salamanders were found to be common. All of the dilute closed basin sites were found in the Rock Mountain Ecoregion. However, these wetland types might also occur in higher elevation regions of the Intermountain Valley and Foothill Ecoregions. All reference wetlands within this class were less than 20 acres, often had small watersheds (<1000 acres), and were found to be very dilute (conductivity <130 uS/cm) and acidic (pH <6.5). An important source of water for these wetlands is snowmelt.

The wetlands in **Class 2** are found in the Rocky Mountain or Intermountain Ecoregions. These wetlands are characterized as being associated with a stream and having watersheds that are often greater than 1000 acres. The wetlands in Class 2 are also characterized as being calcareous fens and/or associated with large springs. Vegetation found in Class 2 may be a combination of sedge, bog birch, willow, cattail or bulrush. Beaver dams are common. The conductivity of the reference wetlands are found to be greater than 130 and less than 1000 uS/cm, and the pH ranged from 6.5 - 8.4.

Class 3 wetlands have moderate alkalinity and a pH that is greater than 7.0 but less than 9.0. Calcium concentrations exceeded 25 mg/L. These wetlands are frequently situated at regionally high elevations and served as recharge areas. Other wetlands that may belong in this class occur in regions that have a high geologic source of gypsum resulting in high calcium concentrations in the water column. Vegetation often found in Class 3 includes bulrush, cattail, sedge and a variety of aquatic plants including pondweed and aquatic buttercup. Only three wetlands were sampled that were determined to be Class 3 sites.

The **Class 4** wetlands are located in the Plains Ecoregion and are associated with streams or springs. Vegetation often associated with these sites includes cattail, sedge, or bulrush. These sites may contain fish. Only four wetlands were sampled that were determined to be Class 4 sites.

Class 5: These wetlands are primarily found in glaciated regions. If riparian or aquatic vegetation is present, it is often dominated by alkali bulrush. Cattails are present only at groundwater discharge areas where the pH is less than 9.0. Many of these wetlands are greater than 10 feet deep with no fish present. The ratio of surface watershed areas to wetland volumes are small inferring the wetlands in this class are groundwater supported. These wetlands often have high alkalinity's (Lab pH near 9.5), depleted calcium concentrations (<25 mg/L), conductivity's <20,000 uS/cm and are usually situated regionally at mid-level regional topographic elevations. Scuds which appear to be tolerant to high alkalinity are very abundant.

Class 6: These wetlands are associated with closed basin geomorphology and are often found in the Unglaciated Plains Ecoregion (surface water drainage) and glaciated regions (groundwater discharge areas) of the Rocky Mountains, Intermountain Valleys or Plains Ecoregions. Wetlands within this class frequently have evaporative salts, are located at regionally low topographical elevations and are often void of aquatic plants. Shore birds are often abundant while fish and scuds are absent. Wetlands within this class may be naturally saline or impaired by agricultural seeps, irrigation return or oil brine. No bioassessment protocols have been developed that can dependably differentiate natural salinity from anthropogenic salinity.

Class 7 wetlands are closed basin sites that are often associated with large watersheds and have well-developed inlets inferring that the source of water is predominated surface runoff. All wetlands evaluated were located in the Plains Ecoregion. Vegetation associated with these wetland sites included bulrush, cattail and aquatic vegetation. Natural wetlands within this class have a wide seasonal range of salinity due to evaporation. Conductivity is often greater than 3500 uS/cm by mid summer. However, the conductivity seldom exceeds 20,000 uS/cm unless stressed by drought conditions. Many of the wetlands in Class-7 may have "seasonal" closed basins due to management activities. These wetlands may belong in Class 9.

The **Class 8** wetlands are often dry by mid summer. All Class 8 wetlands were sampled in the Plains Ecoregion. However, ephemeral wetlands are also located in the Intermountain Valley Ecoregion. These wetlands can be identified by their vegetation which is dominated by submerged terrestrial grasses, or vegetation associated with ephemeral conditions. No cattail or bulrush (developed riparian area) or aquatic vegetation were present. Fish were not present in these wetlands, and scuds were found to be absent or in very low numbers. The wetland geomorphology can be either closed basins or open lakes and are usually shallow (<4 ft). The reference wetlands within this class may be turbid, frequently high in ortho phosphorus (>0.5 mg/L) and usually has a conductivity less than 5,000 uS/cm. The primary source of water for wetlands in this class is surface runoff. All wetlands within this class were sampled in the spring (April-June).

The **Class 9** wetlands are open lakes with outlets that receive water from a large watershed. The riparian area was characterized as being well developed with the primary vegetation being cattails, rush or bulrush. All wetlands evaluated within this class were located within the Plains Ecoregion. The wetlands conductivities were less than 3500 uS/cm unless the outflow was restricted or if drought conditions occurred (late summer). Many of the wetlands evaluated within this class have long periods of restricted outflows due to management activities and "may" belong in Class 7. However, this could be considered impairment.

The wetlands **in Class 10** are open lakes found in the Rocky Mountain or Intermountain Valley Ecoregions. These wetlands are characterized as large permanent open water bodies with outlets and may contain fish. Riparian vegetation often includes cattail, bulrush or lily pads. Water conductivities were found to be less than 1000 uS/cm and the pH was greater than 7.0. Water levels tended to be stable

V) Biocriteria Standards

See attached.

Sources Contacted:

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Planning, Prevention and Assistance Division
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January, 1999

Development of Biocriteria for Wetlands in Montana

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Abstract: A goal of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Attainment of this goal includes development and implementation of wetland water quality standards. In an effort to create wetland specific water quality standards, the Montana Department of Environmental Quality is attempting to develop biocriteria which are sensitive and responsive to changes in wetland water quality. We sampled diatom and macroinvertebrate communities and associated environmental variables from 80 Montana wetlands. We designed the study to sample approximately 75 percent reference sites and 25 percent impaired sites (i.e., having notable anthropogenic impacts). Diatoms were collected as a composite grab sample, identified to the lowest taxonomic level possible and analyzed using multivariate analysis. Macroinvertebrates were collected using a 1 *mm* mesh D-net, identified to a standardized taxonomic level and assessed using multimetric techniques. We classified the wetlands using ecoregions and hydrogeomorphology and further delineated several of the wetland classes using water-column chemistry variables. We found that diatoms and macroinvertebrates were most useful for evaluating the biological integrity of perennial wetlands with open water environments that had relatively stable water levels and were not excessively alkaline or saline. We concluded that multivariate analysis was a useful tool for developing a wetland classification system and that hydrogeomorphology and ecoregions were practical approaches to classifying wetlands for the development of biocriteria. We determined that both the multimetric and multivariate techniques were valuable for developing wetland biocriteria. In most cases, the multimetric and multivariate approaches that we used to assess the macroinvertebrate and diatom communities both identified the same wetlands as impaired.

Key Words: wetlands, biocriteria, reference condition, diatoms, macroinvertebrates, multivariate analysis, multimetrics, classification, hydrogeomorphology, ecoregion, Montana.

Introduction

Montana initiated the development of wetland biocriteria in 1992 with funding from EPA's State Wetlands Protection Program, as defined in Section 104(b) (3) of the Clean Water Act. At that time, the Montana Department of Health and Environmental Sciences (DHES), reorganized in 1996 as the Department of Environmental Quality (DEQ) had little information concerning the status or trends of the water quality of Montana's wetlands. Further, Montana's water quality standards were developed to protect the

beneficial uses (e.g., aquatic life) of lakes, rivers and streams. Wetlands were not considered state waters when Montana's water quality standards were developed; therefore, many of Montana's water quality standards are not applicable for most wetlands. For this reason, we are attempting to develop bioassessment protocols and water quality standards that will more adequately evaluate and protect the aquatic life that live in wetlands.

DEQ initiated the collection of wetland water quality data for several reasons:

- To determine the status and trends in wetland water quality
- To acquire an understanding of how climate, hydrologic controls, and geomorphic settings influence wetland biological communities; in order that they can be classified as required for the development of successful biocriteria.
- To develop biological measurements that could be used in developing biocriteria to define the extent and degree of anthropogenic impacts to wetland water quality.

Background of Wetland Biological Criteria

The main objective of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of the nation's waters, including wetlands (Adamus 1996). Historically, methods of assessing water quality and developing standards for aquatic habitats have typically focused on chemical and physical parameters. However, not all impacts can be detected by using physical and chemical criteria. EPA recognizes that assessing biology contributes data needed to evaluate the condition of aquatic habitats. The agency is encouraging states to monitor the presence or absence, density, and general health of the biota existing within aquatic habitats as an assessment tool in gathering the necessary information to meet the goals of the CWA. EPA has also mandated that states develop standards for wetlands (Adamus and Brandt, 1990). Minimum requirements for these standards include the following:

- Including wetlands in the definition of state waters.
- Establishing beneficial uses for wetlands.
- Adopting existing narrative and numeric criteria for wetlands.
- Applying antidegradation policies to wetlands.
- Adopting narrative biocriteria for wetlands.

Note: DEQ is attempting to surpass this requirement by developing numeric biological criteria for wetlands.

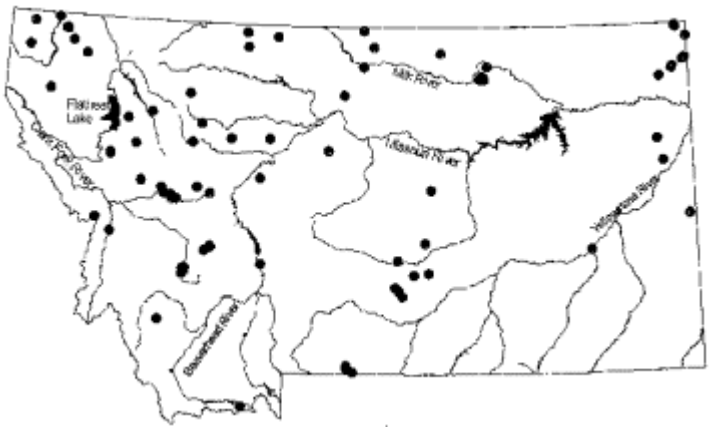
Biocriteria can be either narratives or numbers that describe the aquatic communities of a healthy ecosystem and provide a means to evaluate and protect aquatic life use (EPA 1990's). The term "reference condition" refers to a condition on the best sites that can be found, those least disturbed. Researchers cannot compare all reference sites as one group, they must be classified by their physical, chemical and biological characteristics (Reynoldson et al., 1997); for example a depressional wetland should not be compared with a riverine wetland because water quality impairment cannot be detected where reference sites are biologically different.

Biocriteria are developed to protect biological integrity which is the ability of an aquatic ecosystem to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitats of the region (Karr et al., 1981). Assessing biological integrity requires comparing the biological communities of reference sites to the biological community of the wetland being evaluated. Theoretically, the two should be similar if the community is undisturbed.

Classification is an important component in developing biocriteria. Wetlands have biological communities that reflect climate, hydroperiod, habitat, geomorphology, etc. Classification, a tool to explain and sort out the natural variations in biological communities, has generally been used for spatial variability which is the variance among similar wetlands located in different areas. States often classify aquatic resources by regions that are ecologically similar (Omernik et al. 1997). Wetlands in the mountains, for instance, would be grouped or classified separately from wetlands in the valleys. Temporal variability is the variance occurring over time in the same or similar wetlands, and is usually controlled by developing a sampling index period. For example, protocols may be developed where wetlands are only sampled for macroinvertebrates during the summer when the macroinvertebrate population is stable, because the population often changes between seasons.

Study Areas and Designs

Montana's approach to developing biocriteria currently includes several study designs aimed at developing tools to help detect human influence on wetland water quality. The original study was designed in 1992 by DHES Staff (Dr. Loren Bahls and myself) and involved sampling 80 wetlands throughout Montana from April through September during 1993 and 1994 (Figure 1). The study design included the collection of samples that represent the wetland's macroinvertebrate (e.g., aquatic insects) and diatom (algae) communities which according to Adamus (1996) are considered to be sensitive and responsive to changes in water quality. I sampled a representative number of wetlands from the following ecoregions which are illustrated by Omernik (1986): Rocky Mountains, Intermountain Valley and Prairie Foothills, Glaciated Plains, and Unglaciated Plains. To reduce seasonality, I attempted to sample all wetlands within the same ecoregion during similar time periods. I made an effort to sample wetlands of the Plains Ecoregion from early April through mid-June, wetlands of the Intermountain Valleys and Prairie Foothills Ecoregion from mid-June until early August, and wetlands of the Rocky Mountain Ecoregion from early July through September.



In order to develop a framework for classification, we made an effort to sample the full spectrum of wetland types in Montana. For this study, we defined wetlands as having open water for at least one season and habitat that supports diatom and macroinvertebrate communities. Several of the wetland types targeted for sampling were large, often identified as lakes on topographical maps.

We designed the study to sample approximately 75 percent reference sites and 25 percent impaired sites. Requiring the majority of the wetlands in the study design to be reference sites gave us the ability to determine the reference condition of a wide variety of wetland types. The sampling of wetlands that were impaired provided us the opportunity to test the ability of the biological measurements to detect water quality impairment. Those biological measurements that were consistently and noticeably different when comparisons were made between the impaired wetlands and the reference wetlands were considered to have the ability to detect anthropogenic impacts on water quality.

We also designed the study to include the sampling of numerous wetlands types with differing anthropogenic impacts such as irrigation or logging. A biological measurement's ability could then be tested to determine if it could detect an assortment of anthropogenic impacts on water quality for a variety of wetland types. This was considered important as we wanted to develop a consistent approach to assessing water quality for a wide variety of wetlands.

If anthropogenic activities such as dryland agriculture, irrigation, feedlots, grazing, silviculture, road construction, hydrologic manipulation, urban runoff, wastewater, mining, and oil and natural gas production occurred in the wetland's watershed, we considered the wetland to be impaired. Some of the potential causes of impairment included the following: elevated nutrients, salinity, organic carbon, sediment, metals, and water temperature; introduction of exotic species; destruction of habitat; and fluctuating water levels. We selected wetlands for sampling based on many variables, including the availability of historical data, special interests by other entities, cooperation by land owners and accessibility.

Wetlands evaluated for the study included those located within U.S. Fish and Wildlife Service National Wildlife Refuges and Waterfowl Production Areas (41%), U.S. Forest Service Research Natural Areas and special interest areas (24%), The Nature

Conservancy preserves (4%), Montana Department of Fish, Wildlife and Parks waterfowl production areas and Montana Department of Transportation mitigation sites (13%), and industrial and individual private lands (18%).

Three other studies are currently underway in Montana with the purpose of developing wetland biocriteria. Two of the studies involve sampling depressional wetlands in the Ovando and Mission Valleys of western Montana. We selected depressional wetlands for more intensive research because of the highly variable hydrology, water-column chemistry and biological communities. The third study involves the evaluation of paleolimnological approaches to biological monitoring (Charles 1994). The study in Montana is evaluating how the diatoms in wetland sediment core samples can infer past histories of water quality (Charles 1997).

Researchers from Montana State University designed a study in 1997 that included the development of vegetation biocriteria for western Montana depressional wetlands (Borth 1997). They are attempting to develop vegetation biocriteria because vegetation is easier to assess than macroinvertebrates or diatoms for depressional wetlands that are seasonally dry. Their study design included the sampling of vegetation, macroinvertebrates, and diatoms from 24 depressional wetlands with similar climate, hydrology, and water chemistry. Their study also involved sampling across three levels of human disturbances--minimally impacted, slightly impacted, and moderately impacted; it also involved two anthropogenic impairments--dryland agriculture and grazing

The University of Montana is currently designing a study to determine how chemical and physical gradients, and seasonality influence the macroinvertebrate communities of depressional wetlands located in the Ovando Valley of western Montana. Their study design includes the sampling of macroinvertebrates from 33 depressional wetlands of varying alkalinity, salinity, and hydroperiod, with 6 of the wetlands sampled several times throughout the field season. The study will assist DEQ in refining the wetland classification system and will aid in the development of a sampling index period for western Montana depressional wetlands. These wetlands are also being intensively sampled to develop and test a model for assessing depressional wetlands using the Hydrogeomorphology (HGM) functional assessment approach (Federal Register 1996). After this study is completed, researchers could share data and link biological criteria to HGM.

Sampling Methods (1992 Study Design)

Loren Bahls and I designed the sampling methods to allow 1-2 hours for the data to be collected in the field for each wetland. I collected samples of each wetland's water column, sediment, and macroinvertebrate and diatom communities. In order to document impairments and for classification purposes, I collected water-column and sediment samples for chemical analysis. I collected each sample from a location that I determined to best represent the wetland. These locations were restricted to areas that I found to be easily accessible when wearing hip boots. I also recorded field chemical measurements, observations and photographs at this location. To reduce sampler variability, I collected all the samples myself, and made all the observations for all the wetlands evaluated.

I collected grab samples of each wetland's water column for analysis of common ions, nutrients, total organic carbon, and total recoverable metals. Using a Horiba U-10 Water Quality Checker, I measured field pH, conductivity, salinity, dissolved oxygen, turbidity, and temperature. I collected composite sediment samples from each wetland's substrate for metal analyses. Using a log book, I recorded field information and included the date and time samples were collected; wetland identification and location; ownership; ecoregion; potential sources, causes, and degree of impairment; approximate wetland area and maximum depth; substrate texture; percent open water; water color; vegetation in the upper watershed; riparian and aquatic vegetation; anthropogenic activities within the watershed; hydrogeomorphic features; and wildlife, macroinvertebrate and algae observations.

Using a 1 *mm* mesh D-Net in a sweeping motion, I collected macroinvertebrates from all microenvironments in a sampling location. I composited macroinvertebrate samples and associated materials such as vegetation and sediment, into a 1-liter plastic container and preserved them with ethanol. I made an effort to collect 300 organisms from each location using a consistent method of collection. To insure preservation, I refilled the sample with fresh ethanol several days after collection.

Tetra Tech, Inc. performed the subsampling and sorting of the macroinvertebrate samples (Stribling et al. 1995). Because it took up to 18 hours to sort the macroinvertebrate samples as a 300-organism subsample, Tetra Tech, Inc. modified the subsampling protocol to a 200-organism subsample. At 17 of the 80 sites, an insufficient number of organisms was present in the sample to permit subsampling and the entire sample was sorted and identified. Tetra Tech, Inc. identified a lower threshold of 125 organisms based on a scatter plot of "Number of Individuals" vs. "Total Taxa". Seven wetland sites had fewer than 125 organisms. Through evaluating the chemical and physical data, I determined that there were so few organisms because the sites were either saline, highly alkaline, ephemeral, or impaired.

Tetra Tech, Inc. identified the organisms in the wetland samples and standardized the taxonomic level of identification based on Montana Stream Protocols (Bukantus 1994). Tetra Tech, Inc. eliminated several taxa from consideration for metric development (defined on page 8) as they determined these taxa to be nonbenthic or semi-aquatic surface dwellers and considered them uninformative in reflecting water quality. These taxa included Gerridae, Collembola, Dytiscidae, Hydrophilidae, Ostracoda, Anostraca, Copepoda, Cladocera, Notonectidae and Corixidae (Stribling et al. 1995).

Following methods of Bahls (1993), I collected diatoms as grab samples from the natural substrate such as vegetation and sediment. I collected the diatom samples in a 250-ml plastic container and preserved them with Lugol's solution. The Academy of Natural Sciences of Philadelphia (ANSP) performed the subsampling, digestion, and mounting of the diatoms (Charles et al. 1996). ANSP identified the diatoms to the lowest taxonomic level possible.

In order to classify or document impairment, Mark Shapley, a hydrogeologist for the Montana Natural Heritage Program (MNHP), assisted DEQ in developing a wetland classification system through summarizing and interpreting the physical and chemical data (Shapley, 1995). Using topographic maps, field observations, and information gathered from land management agencies, Shapley interpreted geomorphic

characteristics; collected geologic setting information; developed a hydrogeomorphic database, and a bibliography that included all known sources of geologic, hydrologic, and water quality information; collected interpolated mean annual climatic data including annual precipitation, estimated mean annual evaporation and net precipitation from the Montana Agricultural Potentials System; and generated maps for each wetland using the Geographic Information System (GIS). Map features included were hydrologic delineation's, land management areas, counties, cities, major transportation corridors, wetland watershed boundaries and sampling locations.

Wetland Classification

Shapley and I found that wetland biological communities varied widely among the reference sites. We felt that the major causes of the variability were caused by hydrologic content and functions, the source of the water, geomorphology and climate. We evaluated the following concepts and variables to develop a wetland classification system that would stratify the natural variability of biological communities.

According to Meeks (1990) the hydrologic content primarily affects the chemical and physical aspects of wetlands which, in turn, affect the wetland biological component. Kantrud et al. (1989) found that the source of the water also plays an important role in determining wetland water quality and, consequently, the biological component that lives there. For example, atmospheric water tends to be low in dissolved salts, runoff tends to be intermediate, and groundwater, depending on the characteristics of the substrate, tends to be high. Swanson et al. (1988) determined that wetland hydrologic functions control the chemical characteristics of wetlands, and as a result, plant and invertebrate communities. For example, closed basin wetlands (those without surface water outlets) that receive predominantly precipitation tend to be dilute. Groundwater flow-through systems that are closed basins tend to be higher in dissolved salts. At even higher salt concentrations are closed basin wetlands that lose water primarily to the atmosphere by evapotranspiration. According to Winter (1977), the most important variables to consider in the hydrologic classification of lentic water bodies such as lakes and wetlands to predict certain water-column chemistry are the following: concentration of dissolved substances in groundwater, precipitation-evaporation balance, stream flow inlet and outlet, the ratio of drainage basin area to lake or wetland area, depth, local relief, regional slope, and regional position. Ecoregions are often used by states to group or classify water bodies from regions with similar variables such as climate, land forms, hydrology, etc. (Omernik et al. 1997).

In developing the Montana wetland classification system, we used ecoregions and hydrogeomorphology to explain and sort out the natural variability of macroinvertebrate and diatom communities. We used water chemistry such as pH, alkalinity and conductivity; and vegetation to assist in delineating wetland classes. Both Stribling et al. (1995) and Charles et al. (1996) determined that wetlands located in the Rocky Mountain, Intermountain Valley and Prairie Foothills, and Plains ecoregions had significantly different biological communities. However, they detected no significant differences among ecoregion subclasses.

Hydrogeomorphology has been used extensively to classify water bodies (Rosgen 1993, Cowardin 1979 and Winter 1977). Brinson (1993) has developed and is continuing to refine a hydrogeomorphic approach (HGM) to classify wetlands. Our approach to

wetland classification follows concepts similar to those of HGM, but our wetland classes were also evaluated to determine if reference sites within each class had similar macroinvertebrate and diatom communities.

We currently have delineated 10 wetland classes using hydrogeomorphology, ecoregions and water-column chemistry. The classification system is likely to change in the future as more data are collected and additional wetland reference sites are evaluated.

We classified wetlands using the following ecoregions: *Rocky Mountain; Intermountain Valleys and Prairie Foothills*; and *Plains.* Using hydrogeomorphic features, we further classified wetlands as the following: 1) *Headwater wetlands,* 2) *Riparian Wetlands,* 3) *Open Lake Wetlands*, and 4) *Closed Basin Wetlands.* Headwater Wetlands are located at regionally high elevations like the headwaters of a stream, receive mostly precipitation or snowmelt, and have low pH and conductivity. Riparian wetlands are associated with a stream, large spring, or are calcareous fens, have relatively large watersheds or receive groundwater. Water received by Riparian Wetlands has longer contact with the surrounding soil and geology, so these wetlands tend to have higher pH and conductivities than the Headwater Wetlands. Open Lake Wetlands are ponded sites having an inlet and outlet, and relatively stable water levels. Closed Basin Wetlands are lacking surface water outlets or have outlets that are poorly developed.

Closed Basin Wetlands include depressional wetlands and shallow closed basin reservoirs. We refined the wetland classification system using several chemical and hydrogeomorphic variables such as salinity, alkalinity, topographic position, hydroperiod and watershed/wetland area ratios. The following are examples of the rationale that we used for classifying closed basin wetlands using chemical and hydrogeomorphic variables: closed basin wetlands that are at higher elevations tend to receive predominantly surface water, are dilute and tend to recharge the groundwater; closed basin wetlands that predominantly receive groundwater and are at their hydrologic endpoint, generally are at lower elevations and are saline due to evaporation; closed basin wetlands that have groundwater flowing through them tend to be alkaline; closed basin wetlands that have large watershed/wetland area ratios tend to receive predominantly surface water and often have widely fluctuating water levels during the course of a year; and wetlands that are ephemeral tend to have a lower diversity of macroinvertebrates.

Two wetland types are difficult to classify. Wetlands such as potholes located in the arid west, including Montana, are highly complex and difficult to classify due to both spatial and temporal variability. For these wetlands, the hydrology, water chemistry and biology can change dramatically throughout a season or from year to year as a result of climatic change. For example, the biological community of a wetland often changes due to an increase in salinity or a decrease in water content caused by drought. The classification system may need the ability to change from year to year for those wetlands where a change in climate dramatically changes the biological communities being measured. For example, a wetland that is classified as semi-permanent may need to be reclassified as a seasonal wetland when there is a drought. The second type of wetland that is difficult to classify is large shallow reservoirs. These wetlands are hydrologically manipulated with controlled outlets such as dams or dikes. Large shallow reservoirs can be managed as closed basins (no surface water outlets) or as open lakes (with surface water outlets).

Because wetlands are classified based on whether or not they have inlets or outlets, if a wetland's hydrological features can be changed it is difficult to classify.

Analytical Methods

We used the multimetric approach to evaluate wetland macroinvertebrate communities and the multivariate approach to analyze wetland diatom communities. The multimetric approach incorporates many attributes into the assessment process and has the ability to integrate information from the biological communities to provide an overall indication of biological condition or ecological health (Barbour et al. 1995). Multivariate analysis compliments the development of multimetric indices as it can be used by researchers to detect ecologically meaningful patterns for the development of metrics and a classification system. For this reason, it is advantageous to use both approaches in developing biocriteria (Gerritsen 1995, Karr et al.1997, Norris 1995 and Reynoldson et al. 1997).

A metric is defined as an enumerated or calculated term representing some aspect of a biologic community, such as structure, function, or other measurable feature that changes in a predictable way in response to an anthropogenic stressor (Stribling et al. 1995). For example, a possible metric could be the number of taxa living in the wetland or the relative abundance of taxa that tolerates pollution.

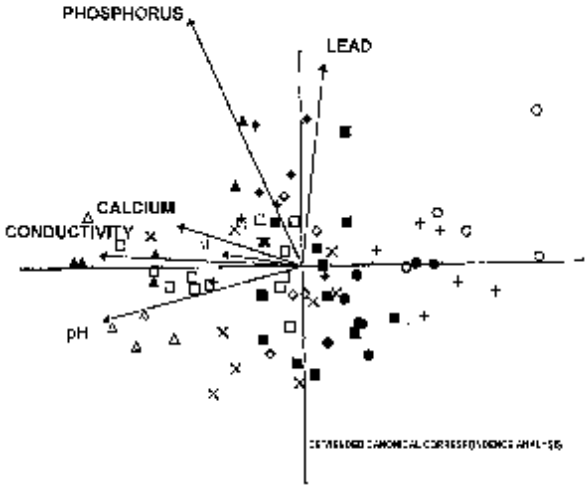
Multimetrics are additive biological indices, meaning they are the sum of several metrics (Gerritsen 1995). The combination of metrics provides a more consistent response to a broad range of human impacts and is used to determine the degree of impairment. The individual metrics are often examined to develop a better understanding of the nature of the impairment (Barbour et al. 1995).

Tetra Tech, Inc. assisted DEQ in developing wetland macroinvertebrate multimetric indices (Stribling et al. 1995). They followed methods similar to those described by Karr and Chu (1997) with the purpose of expressing and interpreting how similar a macroinvertebrate community at a wetland site was to its potential if left undisturbed (i.e., to its reference condition).

One of the advantages of multimetric indices is that they are relatively simple to calculate from collected data (Gerritson 1995). According to Norris (1995), one of the weaknesses of using multimetric indices is that it requires a thorough understanding of each individual metric's ecological relationship in order to evaluate water quality successfully by predicting anthropogenic stressors. For example, for most wetland types a high diversity of macroinvertebrates may indicate reference condition; while for some wetland types, like forested wetlands, a higher diversity of macroinvertebrates may indicate impairment. Further, metrics are often redundant in a combination index and errors can be compounded lessening the ability of the multimetric approach to accurately detect impairment (Reynoldson et al. 1997). Because of this we evaluated both the proposed metrics and associated environmental data in an attempt to develop an understanding of ecological relationships, to test each proposed metric's ability to predict various anthropogenic stressors, and to test redundancy. Tetra Tech, Inc. attempted to provide the ecological rationale for each proposed metric and statistically determined that several of the proposed metrics were redundant (Stribling et al. 1996). Both Tetra Tech, Inc. and I eliminated the proposed metrics that did not appear to have the ability to

detect impairment. I also combined several of the proposed metrics in an effort to develop ecologically meaningful metrics that would predict impairment with greater consistency.

Multivariate analysis is a statistical approach used by biologists to determine relationships among biota such as diatoms or macroinvertebrates, and environmental variables such as water-column chemistry. Multivariate analyses require the sampling of many reference sites for two things: biota, and a wide range of environmental variables such as water-column chemistry. These sites are then classified or grouped based on biota uniformity, which can be used to describe the environmental variables (Norris 1995). Multivariate analysis is a useful exploratory approach that can help uncover patterns when only a little is known about the natural history of a place or biological community, and can play a significant role in the classification of aquatic resources for developing multimetric indices (Gerritsen 1995). Multivariate methods are attractive because they require no prior assumptions either in creating reference site groups or in comparing test sites with reference groups. Unfortunately, potential users may be discouraged by the complexity of multivariate techniques (Reynoldson et al. 1997). The multivariate approaches that ANSP used to investigate relationships between Montana wetland diatom assemblages and environmental variables (mostly water-column chemistry) was Detrended Canonical Correspondence Analysis (DCCA) and two-way indicator analysis (TWINSPAN). ANSP graphically displayed clusters of diatoms with similar composition using DCCA (Charles et al. 1996). Using DCCA, ANSP displayed and labeled vectors to illustrate the relationship between diatom assemblages and environmental variables. Longer vectors show us a stronger correlation among diatom assemblages and environmental variables (Figure 2). ANSP used envelops to graphically enclose all reference sites using the wetland class delineations (Figure 3).



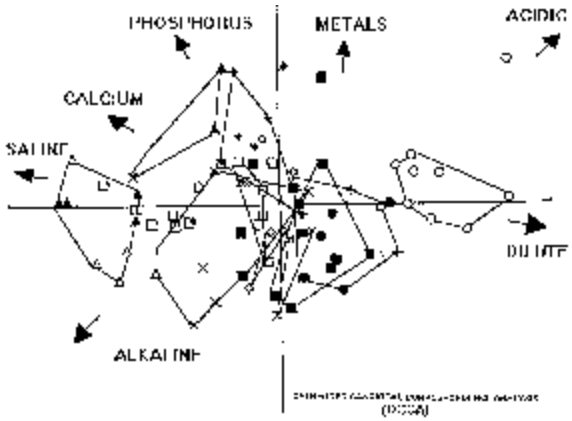


Table 1. Proposed metrics, proposed metric calculations and score calculations used for developing wetland macroinvertebrate indices

Proposed Metrics	Proposed Metric Calculation	Score Calculation
Number of Taxa	Count taxa to lowest level possible	(Number of Taxa) 0.75
Percent Dominance	Accumulative total of percent 1, 2, and 5 most dominant taxa	((300- percent Dominance) 25) 3
POET	Count Plecoptera, Odonata, Ephemeroptera & Tricoptera taxa (species)	(POET) 3
Number of Individuals	Count individuals in total sample (maximum count of 300)	(Number of Individuals 100) 3
Chironomidae	Number of Chir taxa(100-%chir+50) (((%Orthocladiinae to total Chir) 100)+0.5)	(Chironomidae 250) 3
Crustacea/Mollusca	Number of Crustacea & Mollusca Taxa (100-%Crustacea to total Mollusca Taxa)	((Crustacea/Mollusca+50) 100) 3
Leech/Sponge/Clam	Count Hirudinea, Porifera and Sphaeriidea Taxa to lowest level possible	(Leech/Sponge/Clam) 3

Results

With assistance from Tetra Tech, Inc., I developed seven macroinvertebrate biological measurements (i.e., proposed metrics) that appeared to be useful for developing multimetric indices for detecting wetland water quality impairment (Table 1). I chose biological measurements as proposed metrics if they appeared to detect impairment of several types of anthropogenic stressors for the majority of the wetland classes. These metrics did not appear to work for saline or highly alkaline wetlands for two major reasons:

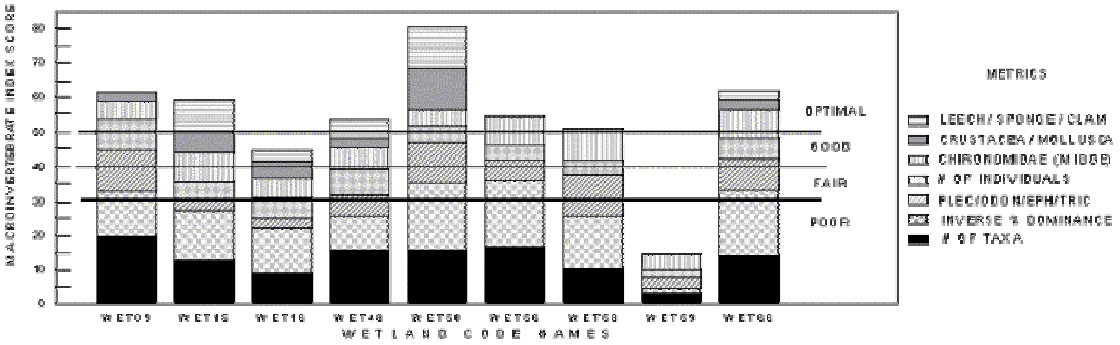
1) metrics could not be calculated, because few of the counted taxa were found in saline wetlands.
2) due to highly variable macroinvertebrate communities, the reference condition could not be determined for highly alkaline wetlands.

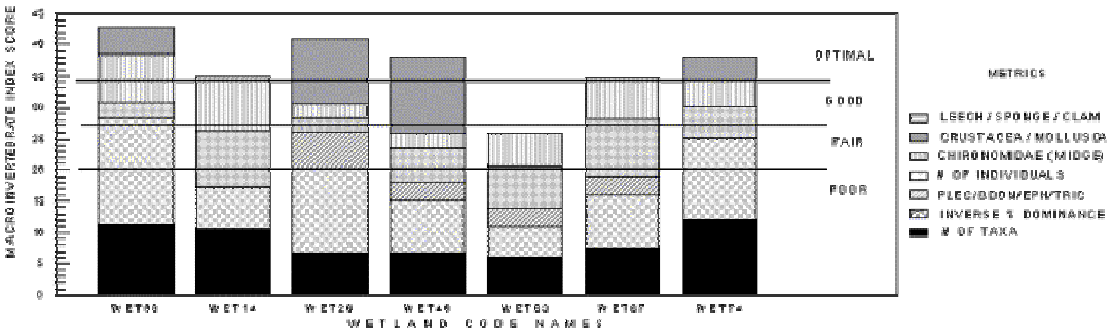
I also found it difficult to detect impairment for shallow depressional wetlands as I believe that they tended to have highly variable macroinvertebrate communities due in part to

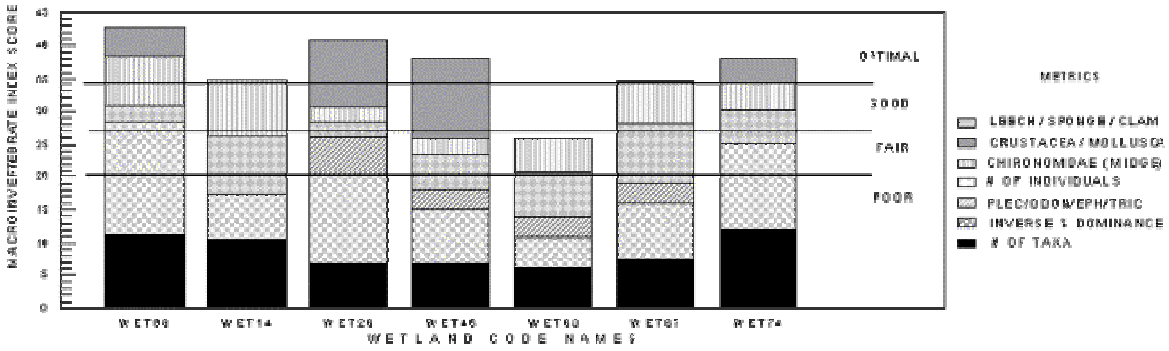
widely fluctuating water levels and salinities. I did find the macroinvertebrate indices most useful for detecting impairment of perennial wetlands with relatively stable water levels and salinities, and at the same time the alkalinity and salinity is low.

I did not score the proposed metrics using 1-3-5 where severely-impaired is scored 1, slightly-impaired is scored 3 and least-impaired is scored 5 (Gerritson 1995 and Karr 1986). Instead, I designed the metric scores to reflect slight changes in the macroinvertebrate community and weighted them according to their ability to respond to anthropogenic stressors. For example, the "Number of Taxa" and "Percent Dominance" metrics appeared to be the most responsive to stressors; therefore, their scores were given the greatest weight. The "number of individuals" metric was the least responsive to stressors; therefore, its score was weighted the least.

For several of the metrics, the maximum scores were theoretically infinite, but the maximum score for these metrics did tend to level off as it reached its maximum potential (reference condition). For example, the maximum "Number of Taxa" score (potential) for a riparian wetland and ephemeral depressional wetland was approximately 28 and 15, respectively. Since each metric had a different potential for each wetland class, the multimetric macroinvertebrate index scores for reference condition also differed between wetland classes. Eventually, we intend to normalize the scoring in a way where the reference condition for all wetland classes will have the same score.







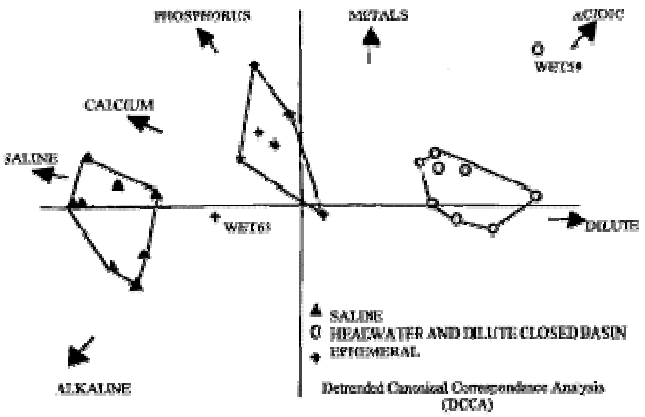
I developed decision thresholds of optimal, good, fair, and poor using best professional judgment to delineate wetland biological condition (Figures 4, 5 and 6). The ability to develop decision thresholds varied with each wetland class as it depended in part on the number of reference and impaired sites sampled. I rated the reference sites as optimal. I further evaluated wetland sites that were considered reference condition but had an index score different from other reference sites within the same class to determine if they were misclassified, impaired, resulting from sampling or analytical errors, or influenced by seasonality or anthropogenic stressors. The delineation of the remaining decision thresholds (i.e., good, fair, and poor) incorporated the evaluation of sites with documented impairment and the variability of reference site index scores within each wetland class. Physicochemical and historical data, field notes and photographs assisted in the delineation of the decision thresholds.

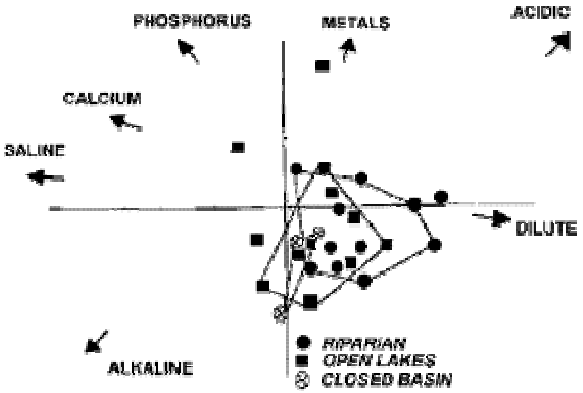
ANSP analyzed Montana's wetland diatom assemblages and associated environmental variables such as water-column chemistry using the multivariate analyses DCCA and TWINSPAN (Charles et al. 1996). Using DCCA, ANSP determined that phosphorus, conductivity and pH which had the longest vectors were strongly correlated with diatom assemblages. There also appeared to be a correlation between diatom assemblages and calcium and lead; however, the vectors are shorter (Figure 2, page 9). Stevenson and Yangdong (1996) also discovered that diatoms strongly correlated to phosphorus and conductivity in wetlands located in western Kentucky; and McCormick et al. (1996) determined that periphyton taxonomic composition related strongly to total phosphorus in the Florida Everglades.

ANSP used both DCCA and TWINSPAN to test and refine the wetland classification and for detecting water quality impairment. ANSP categorized the wetland sites according to the predetermined wetland classes. Envelops enclosed all of the reference sites within each class in the DCCA graphs. I evaluated outlier sites, such as WET59 and WET63 to determine if they were impaired or misclassified (Figure 7).

ANSP determined that for most of the predetermined classes, diatom assemblages clustered fairly well using DCCA, showing that they are biologically similar (Charles et al. 1996) (Figure 3, page 9). I further evaluated wetland classes with high variability in diatom assemblages to determine if wetlands were misclassified or if additional class delineation's were necessary. If significant overlap occurred between classes, I evaluated them further to determine if they could be combined.

Graphs generated using DCCA to analyze diatom assemblages demonstrated that three wetland classes--Riparian, Open Lakes and Groundwater Recharge Closed Basin-- had significant overlap of their reference sites (Figure 8). Upon further evaluation, I determined that although these wetlands differed hydrologically, the water-column chemistry, diatom assemblages, and macroinvertebrate multimetric indices were similar for these classes. For this reason, I concluded that these classes could be combined, though I felt that more wetlands should be sampled and evaluated to confirm these conclusions.





Graphs generated using DCCA also illustrated that the Alkali Closed Basin Wetland class had two reference wetland sites that appeared to be outliers (Figure 9). These wetlands seemed to be hydrologically similar, but they differed from the other reference sites biologically and chemically; consequently, the classification system may need to be refined in the future.

We considered the outliers of the enveloped reference sites in the DCCA graphs as impaired (Figures 7, 8 and 9). The greater the distance between the outlier site and the enveloped centroid of the reference sites, the greater the impairment. The location of the outlier sites often indicates the cause of impairment. For example, outlier sites located in

the far upper right quadrant may be receiving acid mine drainage (e.g., WET59), while salinity might be impacting outlier sites (e.g., WET63) located toward the left side of the enveloped reference sites (Figure 7, page 13).

The TWINSPAN analysis produced seven distinct wetland diatom assemblage groupings similar to DCCA clusters. The TWINSPAN analysis, however, did not distinguish ephemeral from perennial wetlands. Probably, hydrologic content is less important to diatoms than to macroinvertebrates since diatoms have shorter life spans. TWINSPAN also appeared to group wetlands that had high sediment. The sediment likely came from two sources: highly variable water levels that exposed the sediment or intensive agriculture that resulted in sediment from runoff. ANSP characterized this group by an abundance of motile diatom taxa, particularly Nitzschia and Navicula (Charles et al. 1996).

Conclusion

The bioassessment protocols that we are developing appear to be able to detect anthropogenic impacts on wetland water quality for several wetland types. These wetlands tended to be perennial and had relatively stable water levels. In most cases, both the multimetric approach using macroinvertebrates and the multivariate approach using diatoms identified the same wetlands as impaired. Neither approach to develop diatom or macroinvertebrate biocriteria detected impairment in saline or highly alkaline wetlands. However, diatom biocriteria appears to be more promising for detecting impairment in saline and alkaline environments because the diatom communities are more complex and therefore may provide more ecologically meaningful information.

Macroinvertebrate and diatom biocriteria are not likely to be the most useful for detecting impairment in wetlands lacking surface water as they would be difficult to sample. Vegetation biocriteria are likely to be the most appropriate for assessing the biological condition of these wetland types. Due to longer life spans, macroinvertebrates appeared to be most useful for detecting habitat impairment as they are more capable than diatoms of integrating impairment over time. Diatoms appeared to be most responsive to excessive nutrients, salinity, sediment, acidity, and metals in the water column that existed during the time of sampling or that occurred 2-3 weeks prior to sampling. Diatoms found in sediment core samples may also be useful for inferring historical changes in wetland water quality for some wetland types.

We were unable to infer elevated trace metal concentrations in the wetland sediment by assessing the diatom or macroinvertebrate communities. Apparently, elevated trace metal concentrations in the sediment do not necessarily impact diatom or macroinvertebrate communities that live in the water column or on the surface of the bottom sediments. We also had difficulty determining if physical disturbances such as sedimentation or habitat alteration were impacting a wetland's biological community because the physical disturbances were only described; not measured. A more quantitative approach is needed for the measurement of wetland physical characteristics if we are to link physical disturbances to changes in the biological communities.

The multivariate approach was useful for detecting wetland water quality impairment, and therefore may also be useful for detecting ecologically meaningful patterns that can be used for developing metrics. We found DCCA to be useful as it often indicated which

measured environmental variables were causing impairment such as elevated nutrients or trace metals. It was however, difficult for us to evaluate the degree of impairment.

We feel that classification is one of the most important components for developing successful wetland biocriteria. Wetland hydrology, water-column chemistry, and biological communities tend to be highly variable both spatially and temporally. It is difficult to develop a classification system that will stratify the natural variability of wetland biological communities so that anthropogenic impacts can be consistently detected. Hydrogeomorphology appears to be a useful approach to wetland classification. Still, the relationship between wetland biological communities such as diatoms and macroinvertebrates and hydrogeomorphology is not well understood. Multivariate analysis is an important tool for wetland classification because it is an objective approach that detects patterns in biological assemblages caused by natural variability, such as wetland site groupings. Consequently, a researcher can use multivariate analysis to initiate the development of a classification system without any bias; or to test conceptual approaches to wetland classification such as hydrogeomorphology or ecoregions.

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http://www.deq.state.mt.us/ppa/mdm/Wetlands/Lakes&Wetlands_Index.asp

New Mexico's Treatment of Wetlands

I) Summary

New Mexico currently does not single out wetlands for either special classification or protection; they are, instead, grouped under "surface waters of the state". According to the source, John Montgomery, if waters are unclassified, they are protected under criteria for wildlife and livestock.

II) Water Quality Standards

See also: Clean Water Act: New Mexico

20.6.4.10 APPLICABILITY OF WATER QUALITY STANDARDS:

A. **Livestock Watering and Wildlife Habitat Uses**:

(1) When a discharge creates a water which could be used by livestock and/or wildlife in a nonclassified, otherwise ephemeral surface water of the state, such water shall be protected for the uses of livestock watering and/or wildlife habitat by the standards applicable to these uses as set forth in 20.6.4.900 NMAC.

(2) Designated uses of such water will be limited to livestock watering and/or wildlife habitat only when such a water does not enter a classified surface water of the state with criteria which are more restrictive than those necessary to protect livestock watering and/or wildlife habitat, except in direct response to precipitation or runoff. The commission shall adopt any additional designated uses for such surface waters of the state by rulemaking proceedings.

III) Wetlands Definition

STATE OF NEW MEXICO STANDARDS FOR INTERSTATE AND INTRASTATE SURFACE WATERS
20.6.4 NMAC
20.6.4.7 DEFINITIONS:

"Surface water(s) of the state" means all interstate waters including interstate wetlands, and all intrastate waters, such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, reservoirs or natural ponds the use, degradation, or destruction of which would affect interstate or foreign commerce. Surface waters of the state also means all tributaries of such waters, including adjacent wetlands, and any manmade bodies of water which were originally created in surface waters of the state or resulted in the impoundment of surface waters of the state. Surface waters of the state does not include private waters that do not combine with other surface or subsurface water or any water under tribal regulatory jurisdiction pursuant to § 518 of the Clean Water Act. Waste treatment systems, including treatment ponds or lagoons designed to meet requirements of the Clean Water Act (other than cooling ponds as defined in 40 CFR 423.11(m) which

also meet the criteria of this definition), are not surface waters of the state, unless they were originally created in surface waters of the state or resulted in the impoundment of surface waters of the state.
http://www.nmenv.state.nm.us/NMED_regs/swqb/20_6_4_nmac.pdf

IV) Wetlands Classification

None.

V) Biocriteria Standard

None

VI) Source Contacted

Water Quality Standards
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North Dakota's Treatment of Wetlands

I) Summary

The source consulted stated that North Dakota wetlands are classified as separate using the Cowardin System (a comprehensive classification system of wetlands and deepwater habitats that was developed for the U.S. Fish and Wildlife Service http://h2osparc.wq.ncsu.edu/info/wetlands/class.html) but protected under the same standards as Class 1 streams. North Dakota has also begun a small pilot for assessment of wetlands using biocriteria.

II) Water Quality Standards

See also: Clean Water Act: North Dakota

CHAPTER 33-16-02.1
STANDARDS OF QUALITY FOR WATERS OF THE STATE

Category 1: Very high level of protection that automatically applies to Class I and Class IA streams and Class 1, 2, and 3 lakes, and wetlands that are functioning at their optimal level. In addition, Category 1 is presumed to apply to Class II and Class III streams. Particular Class II and Class III streams may be excluded from Category 1 if, at the time of the antidegradation review, it is determined that one or both of the following criteria are applicable:

1) there is no remaining assimilative capacity for any of the parameters that may potentially be affected by the proposed regulated activity in the segment in question, or

2) an evaluation submitted by the project applicant demonstrates (based on adequate and representative chemical, physical, and biological data) that aquatic life and primary contact recreation uses are not currently being attained because of stressors that will require a long-term effort to remedy.

Evaluations in response to Criterion #2 must include more than an identification of current water quality levels. They must include evidence of the current status of the aquatic life and primary contact recreation uses of the segment.

http://www.health.state.nd.us/wq/sw/Z7_Publications/B_NDCC_WQS.pdf

III) Wetlands Definition

Wetlands. These water bodies are to be considered waters of the state and will be protected under section 33-16-02-08.

http://www.state.nd.us/lr//information/acdata/pdf/33-16-02.1.pdf

IV) Wetlands Classification

The commonly used wetland classification system in South Dakota and North Dakota is the Cowardin System (Cowardin, and others. 1979). The Cowardin System is used by the U.S. Fish & Wildlife Service and Natural Resource Conservation Service (NRCS) and is currently the system used to develop the National Wetlands Inventory (NWI). The accompanying table shows the terminology with a description.

Cowardin System

All wetlands in South Dakota belong to one of three different systems:

- Palustrine: Marsh or Pond-like
- Lacustrine: Lake-like
- Riverine: River-like

Each of these systems will include a water regime as outlined below:

DESCRIPTION	TERMINOLOGY
Water through June	Palustine Temporary
Water through July	Palustrine Seasonal
Water through Growing Season	Palustrine Semi-Permanent
Water through year in most years	Palustrine Intermittent
Water through year in all years	Lacustrine Permanent

Permanent or permanently flooded:	Water covers the land surface throughout the year in all years.
Intermittent or intermittently flooded:	Water covers the land surface throughout the year in most years.
Semi-permanent or semi-	Water covers the land surface throughout the growing season in

permanently flooded:	most years.
Seasonal or seasonally flooded:	Water covers the land surface for most of the growing season, but is usually absent by the end of the season in most years.
Temporary or temporarily flooded:	Water covers the land surface for brief periods during the growing season.

V) Biocriteria Standards

A pilot project to integrate HGM and biological criteria approaches for assessing wetland functions and conditions

Past projects were to develop a biological index to be used as an assessment tool and as a regulatory tool to ensure the biological functions of the state's wetlands are maintained and improved. This project is to explore opportunities to integrate IBI and HGM assessment methods to strengthen the biological components of HGM and incorporate hydrologic and landscape factors into IBI to create a new model which accurately measures the biological functions of wetlands described in through an HGM approach.

http://www.epa.gov/region8/water/bio/biodetail.html#n1

VI) Sources Contacted

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South Dakota's Treatment of Wetlands

I) Summary

According to the state source, Patrick Snyder, beneficial uses of wetlands are the same as for fish and wildlife propagation. Wetlands are protected as 'waters of the state'. They have no specific numeric or narrative criteria. They are classified according to the Cowardin System (see attached).

II) Water Quality Standards

See also: Clean Water Act: South Dakota
74:51:01:11. Protection of wetlands as waters of the state.
Wetlands are waters of the state and are allowed protection under the provisions of this chapter. The discharge of pollutants from any source, including indiscriminate use of fill material, may not cause destruction or impairment of wetlands except where authorized under § 402 or § 404 of the Federal Water Pollution Control Act as amended to February 4, 1987, or under 40 C.F.R. Parts 257 and 258, Solid Waste Disposal Facility Criteria; Final Rule, as amended to July 1, 1996. The provisions of §§ 74:51:01:06 to 74:51:01:10, inclusive, 74:51:01:12, 74:51:01:34 to 74:51:01:39, inclusive, 74:51:01:52, and 74:51:01:63 to 74:51:01:65, inclusive, apply to all wetlands. In addition, the department shall evaluate wetlands to determine the applicability of such wetlands to the toxic pollutant standards provided in § 74:51:01:55 and Appendix B at the end of this chapter.

III) Wetland Definition

"Wetlands," those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions including swamps, marshes, bogs, and similar areas;
http://legis.state.sd.us/rules/rules/7451.htm#74:51:01:01

IV) Wetland Classification

The commonly used wetland classification system in South Dakota and North Dakota is the Cowardin System (Cowardin, and others. 1979). The Cowardin System is used by the U.S. Fish & Wildlife Service and Natural Resource Conservation Service (NRCS) and is currently the system used to develop the National Wetlands Inventory (NWI). The accompanying table shows the terminology with a description.

Cowardin System

All wetlands in South Dakota belong to one of three different systems:

- Palustrine: Marsh or Pond-like
- Lacustrine: Lake-like
- Riverine: River-like

Each of these systems will include a water regime as outlined below:

DESCRIPTION	TERMINOLOGY
Water through June	Palustine Temporary
Water through July	Palustrine Seasonal
Water through Growing Season	Palustrine Semi-Permanent
Water through year in most years	Palustrine Intermittent
Water through year in all years	Lacustrine Permanent

Permanent or permanently flooded:	Water covers the land surface throughout the year in all years.
Intermittent or intermittently flooded:	Water covers the land surface throughout the year in most years.
Semi-permanent or semi-permanently flooded:	Water covers the land surface throughout the growing season in most years.
Seasonal or seasonally flooded:	Water covers the land surface for most of the growing season, but is usually absent by the end of the season in most years.
Temporary or temporarily flooded:	Water covers the land surface for brief periods during the growing season.

V) Biocriteria Standards

None.

VI) Source Contacted

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Utah's Treatment of Wetlands

I) Summary

Both sources consulted agreed the State of Utah currently has no water quality standard, definitions, or classifications for wetlands. Brian Nicholson uses standards 3C and 3D in the interim.

II) Water Quality Standards

See also: Clean Water Act: Utah
Environmental Quality, Water Quality.
Standards of Quality for Waters of the State.
http://waterquality.utah.gov/documents/DOC_RULE.HTM

III) Wetlands Definition

R317-2-6. Use Designations.

The Board as required by Section 19-5-110, shall group the waters of the state into classes so as to protect against controllable pollution the beneficial uses designated within each class as set forth below. Surface waters of the state are hereby classified as shown in R317-2-13.

- Class 3C -- Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain.

- Class 3D -- Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.

http://www.rules.utah.gov/publicat/code/r317/r317-002.htm#T7

IV) Wetlands Classification

None.

V) Biocriteria Standards

None.

VI) Sources contacted

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Wyoming's Treatment of Wetlands

I) Summary

Wyoming has an extensive definition for wetlands. Wetlands are also included within their Surface Water Classification List; they are considered Class 1 waters if they are adjacent to Class 1 waters. Otherwise, they are included in various Class 3 designations. Wetlands are listed separately within the Wyoming Surface Water Quality Standards. There are no biocriteria standards.

II) Water Quality Standards

74:51:01:11. Protection of wetlands as waters of the state. Wetlands are waters of the state and are allowed protection under the provisions of this chapter. The discharge of pollutants from any source, including indiscriminate use of fill material, may not cause destruction or impairment of wetlands except where authorized under § 402 or § 404 of the Federal Water Pollution Control Act as amended to February 4, 1987, or under 40 C.F.R. Parts 257 and 258, Solid Waste Disposal Facility Criteria; Final Rule, as amended to July 1, 1996. The provisions of §§ 74:51:01:06 to 74:51:01:10, inclusive, 74:51:01:12, 74:51:01:34 to 74:51:01:39, inclusive, 74:51:01:52, and 74:51:01:63 to 74:51:01:65, inclusive, apply to all wetlands. In addition, the department shall evaluate wetlands to determine the applicability of such wetlands to the toxic pollutant standards provided in § 74:51:01:55 and Appendix B at the end of this chapter.

Source: 19 SDR 111, effective January 31, 1993; transferred from § 74:03:02:58, July 1, 1996; 24 SDR 10, effective July 20, 1997.

General Authority: SDCL 34A-2-11, 34A-2-93.
Law Implemented: SDCL 34A-2-10, 34A-2-11, 34A-2-21.
Cross-Reference: Criteria for toxic pollutants, § 74:51:01:55.

http://legis.state.sd.us/rules/rules/7451.htm#74:51:01:11

III) Wetland Definitions

WATER QUALITY RULES AND REGULATIONS
WYOMING SURFACE WATER QUALITY STANDARDS
Section 2. Definitions.

a. The definitions in section 35-11-103(a) and (c) of the Wyoming Environmental Quality Act apply to these rules. For example:

   (i) "Compensatory mitigation" means replacement, substitution or enhancement of ecological functions and wetland values to offset anticipated losses of those values caused by filling, draining or otherwise damaging a wetland.

(v) "Man-made wetlands" means those wetlands that are created intentionally or occur incidental to human activities, and includes any enhancement made to an existing wetland which increases its function or value;

(vi) "Mitigation" means all actions to avoid, minimize, restore and compensate for ecological functions or wetland values lost;

(vii) "Natural wetlands" means those wetlands that occur independently of human manipulation of the landscape;

(xii) "Waters of the state" means all surface and groundwater, including waters associated with wetlands, within Wyoming;

(xiii) "Wetlands" means those areas in Wyoming having all three (3) essential characteristics:

a. Hydrophytic vegetation;
b. Hydric soils; and
c. Wetland hydrology.

(xiv) "Wetland value" means those socially significant attributes of wetlands such as uniqueness, heritage, recreation, aesthetics and a variety of economic values.

b. The following definitions supplement those definitions contained in section 35 11-103 of the Wyoming Environmental Quality Act.

(ii) "Adjacent wetlands" means wetlands that are connected by a defined channel to a surface tributary system, or are within the 100 year flood plain of a river or stream, or occupy the fringe of any still water body which is connected by a defined channel to a surface tributary system.

(xxiii) "Hydrophytic vegetation" means a community of plants where, under normal circumstances more than 50 percent of the composition of the dominant species from all strata are obligate wetland (OBL), facultative wetland (FACW), and/or facultative (FAC) species; or a frequency analysis of all species within the community yields a prevalence index value of less than 3.0 (where OBL = 1.0, FACW = 2.0, FAC = 3.0, FACU (facultative upland) = 4.0, and UPL (upland species) = 5.0).

(xxiii) "Surface waters of the state" means all perennial, intermittent and ephemeral defined drainages, lakes, reservoirs, and wetlands which are not man-made retention ponds used for the treatment of municipal, agricultural or industrial waste; and all other bodies of surface water, either public or private which are wholly or partially within the boundaries of the state. Nothing in this definition is intended to expand the scope of the Environmental Quality Act, as limited in W.S. 35-11-1104.

(xxiii) "Wetland hydrology" means the presence of water on or near the land surface at a frequency and duration to cause the formation of hydric soils and support

a prevalence of vegetation typically adapted to saturated and/or inundated conditions.

http://deq.state.wy.us/wqd/watershed/11567-doc.pdf

Wetland Classification:

For Class 1 Waters:

d. Wetlands. All adjacent wetlands shall have the same classification as the water to which they are adjacent

http://deq.state.wy.us/wqd/watershed/2-3648-doc.pdf

Wyoming Surface Water Classification List:

Section 4. **Surface Water Classes and Uses**. The following water classes are a hierarchical categorization of waters according to existing and designated uses. Except for Class 1 waters, each classification is protected for its specified uses plus all the uses contained in each lower classification. Class 1 designations are based on value determinations rather than use support and are protected for all uses in existence at the time or after designation. There are four major classes of surface water in Wyoming with various subcategories within each class (see "Wyoming Surface Water Classification List" for current listing).

(a) Class 3, Aquatic Life Other than Fish. Class 3 waters are waters, other than those designated as Class 1, that are intermittent, ephemeral or isolated waters and because of natural habitat conditions, do not support nor have the potential to support fish populations or spawning, or certain perennial waters which lack the natural water quality to support fish (e.g., geothermal areas). Class 3 waters provide support for invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. Uses designated on Class 3 waters include aquatic life other than fish, recreation, wildlife, industry, agriculture and scenic value. Generally, waters suitable for this classification have wetland characteristics, and such characteristics will be a primary indicator used in identifying Class 3 waters. There are three subcategories of Class 3 waters.

(i) Class 3A. Class 3A waters are isolated waters including wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable.

(ii) Class 3B. Class 3B waters are tributary waters including adjacent wetlands that are not known to support fish populations or drinking water supplies and where those uses are not attainable. Class 3B waters are intermittent and ephemeral streams with sufficient hydrology to normally support and sustain communities of aquatic life including invertebrates, amphibians, or other flora and fauna which inhabit waters of the state at some stage of their life cycles. In general, 3B waters are characterized by frequent linear wetland occurrences or impoundments within or adjacent to the stream channel over its entire length. Such characteristics will be a primary indicator used in identifying Class 3B waters.

(iii) Class 3C. Class 3C waters are perennial streams without the natural water quality potential to support fish or drinking water supplies but do support wetland characteristics. These may include geothermal waters and waters with naturally high concentrations of dissolved salts or metals or pH extremes.

http://deq.state.wy.us/wqd/watershed/11567-doc.pdf

V) Biocriteria Standards

None.

VI) Sources Contacted

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