

# Review of Aquatic Life Use Designations for Select States

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## 1.0 PROJECT BACKGROUND

In September 2000, U.S. EPA Region VII (EPA) issued a formal review of Missouri's Water Quality Standards to the Missouri Department of Natural Resources (MDNR). Within the review, EPA noted that emphasis on recreationally important fish species within Missouri's beneficial use definitions may not fully address the biologic integrity goal of the Federal Clean Water Act of 1972 (CWA). EPA identified Tiered Aquatic Life Uses (TALUs) as a possible approach to resolve this concern.

In spring 2006, the Missouri Clean Water Commission directed MDNR to form several Clean Water Policy Workgroups, including the Tiered Aquatic Life Use Advisory Group. As part of the Ecological and Water Resources Assessment Project (EWRAP), the Environmental Resources Coalition (ERC) and MEC Water Resources Inc. (MEC) provided the following technical support to the Missouri Tiered Aquatic Life Use Advisory Group:

- Evaluation of aquatic life use frameworks implemented by States having established bioassessment programs;
- Tiered Aquatic Life Use presentations; and
- Attendance of Advisory Group meetings to provide technical support.

The following sections include an overview of TALU concepts and a summary of aquatic life uses for selected States. Appendix A includes an individual summary of the aquatic life uses in each state that was reviewed. A TALU presentation authored by MEC and ERC, and an Advisory Group Progress presentation authored by MDNR are also available by request.

## 2.0 TIERED AQUATIC LIFE USES

Protection of biologic integrity is a principle goal of the Federal Clean Water Act. Nationally and within Region VII, EPA supports the implementation of Tiered Aquatic Life Uses (TALU) to provide accurate aquatic life use protection (Jackson 2003, USEPA 1994). TALUs are biologically-based determinations of the expected aquatic condition in a waterbody. They are separate and specific designated uses that are differentiated or 'tiered' along a Biological Condition Gradient (BCG).

The BCG is a conceptual model used for interpreting the biological response of the aquatic community in response to increasing stressors. The BCG model is divided into six tiers that represent the condition of the biological community (Figure 1). It describes the complete range of aquatic conditions from the healthiest, most undisturbed community in the first tier to severely altered communities in tier 6 (USEPA 2005, Davies and Jackson 2006).

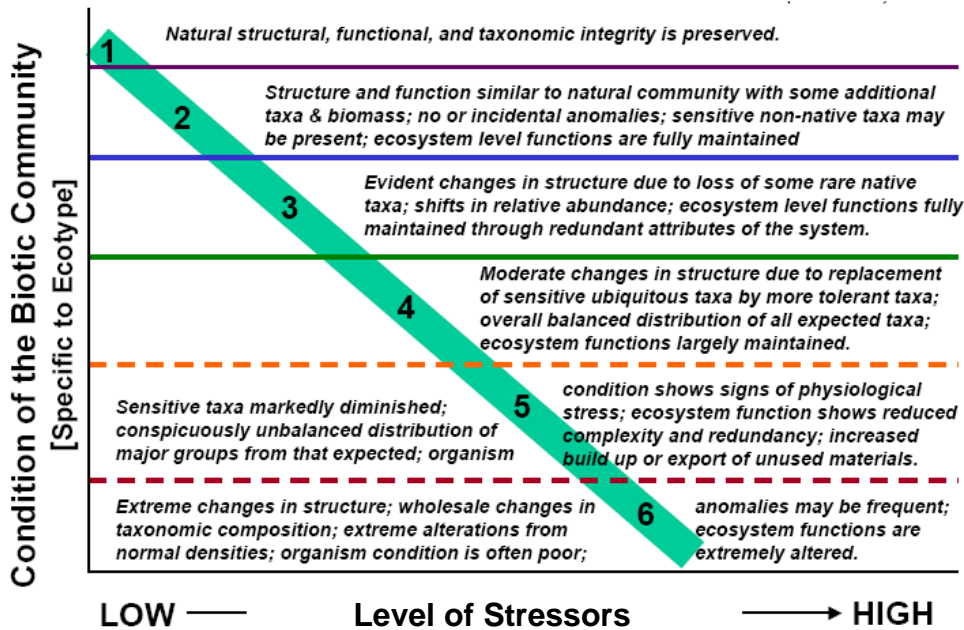


FIGURE 1. Conceptual Diagram of the Biological Condition Gradient. (Adapted from Jackson 2003).

Streams are assigned to one of the six tiers based on the quality of the aquatic condition as measured by 10 system attributes (Table 1). These 10 attributes measure community structure and function, organism condition and system performance, and the interactions between physical habitat and the biota (USEPA 2005). If enough biological monitoring data is available, the conceptual BCG model can be “calibrated” to describe the tiers in terms of the biota specific to a region or state. With a properly calibrated model, states can better describe the change in the composition of the aquatic community with increasing levels of stressors across the BCG tiers (USEPA 2005). The ability to accurately predict the change in the aquatic community in response to disturbance is fundamental to the TALU approach of beneficial use development.

The degree of human disturbance in the watershed is not the only determinant of the quality of the aquatic community. Physiogeographic differences also dictate the distribution and composition of aquatic communities (Barbour et al. 1996). This is especially relevant in Missouri where 19 distinct ecological drainage units (EDUs) have been identified (MDNR 2002, Sowa et al. 2004). An EDU is a geographical area that contains relatively distinct assemblages of aquatic organisms (Sowa et al. 2004). In order to accurately protect aquatic life, a TALU system must consider the natural spatial variability that is present in aquatic communities.

An important determinant of BCG model calibration with respect to regional differences is the ability to describe regional reference conditions. The reference condition reflects the highest attainable aquatic condition for the region and acts as the benchmark by which to judge impairment in other waterbodies (Barbour et al. 1996, USEPA 2005).

Because natural habitats do not exist, acceptable reference conditions are those in which habitat is of sufficient quality to support a minimally disturbed aquatic community (Barbour et al. 1996). The regional reference condition can be identified directly through reference site evaluations, or indirectly through a combination of historical data, simulation modeling, and best professional judgment (Barbour et al. 1996).

**TABLE 1.** Biological Condition Gradient Attributes.

Measured Response	BCG Attribute	Attribute Description*
Taxonomic Composition/ Structure	1	Endemic Species
	2	Sensitive Rare Taxa
	3	Sensitive Ubiquitous Taxa
	4	Taxa of Intermediate Tolerance
	5	Tolerant Taxa
	6	Introduced Taxa
Organism Condition/ System Performance	7	Organism Condition
	8	Ecosystem Function
Habitat/Biota Interactions	9	Spatial/Temporal Stressors
	10	Ecosystem Connectance

\* - See Jackson (2005) for further discussion of biological attributes.

To quantify the minimally disturbed aquatic communities associated with regional reference conditions, States must have an established biomonitoring program. The data collected through routine biological assessments of reference streams aid in the development of numeric thresholds, or biocriteria, which are used to quantitatively define the acceptable reference conditions. Biocriteria are needed to define the tiers and significant changes of ecology associated with the BCG model (Barbour et al. 1996, USEPA 2005).

If sufficient data are available, the concept of tiering along the BCG can also be applied to water quality criteria (USEPA 2005). Once a tiered use system is in place, the regulatory agency can develop water quality criteria that are specific to the requirements of the aquatic life in each tier. Tier-specific criteria are necessary because the differing quality of the aquatic communities that is represented by the BCG cannot be supported by the same water quality (USEPA 2005). For example, the dissolved oxygen concentration necessary to support a Tier 5 aquatic community would not support the more natural and sensitive species that make up a Tier 1 community. Therefore, water quality criteria that are specific to each tiered use must be developed. Enacting specific water quality criteria provides a more accurate level of protection and allows resources to be used more efficiently (USEPA 2005).

Several states have incorporated aspects of a TALU system into their water quality standards and management decisions. The States of Ohio and Maine are two of the most successful examples of TALU implementation.

## 2.1 The TALU Approach in Ohio

The State of Ohio currently implements warmwater aquatic life use classifications that are tiered according to regional biocriteria (Yoder and Rankin 1995). Ohio applies 4 tiered uses as compared to the six in the conceptual BCG. The tiered warmwater categories are Exceptional, Warmwater, and Modified Warmwater Habitat (Figure 2). Ohio also has a Limited Resource Water category that is applied to warm and cold waters.

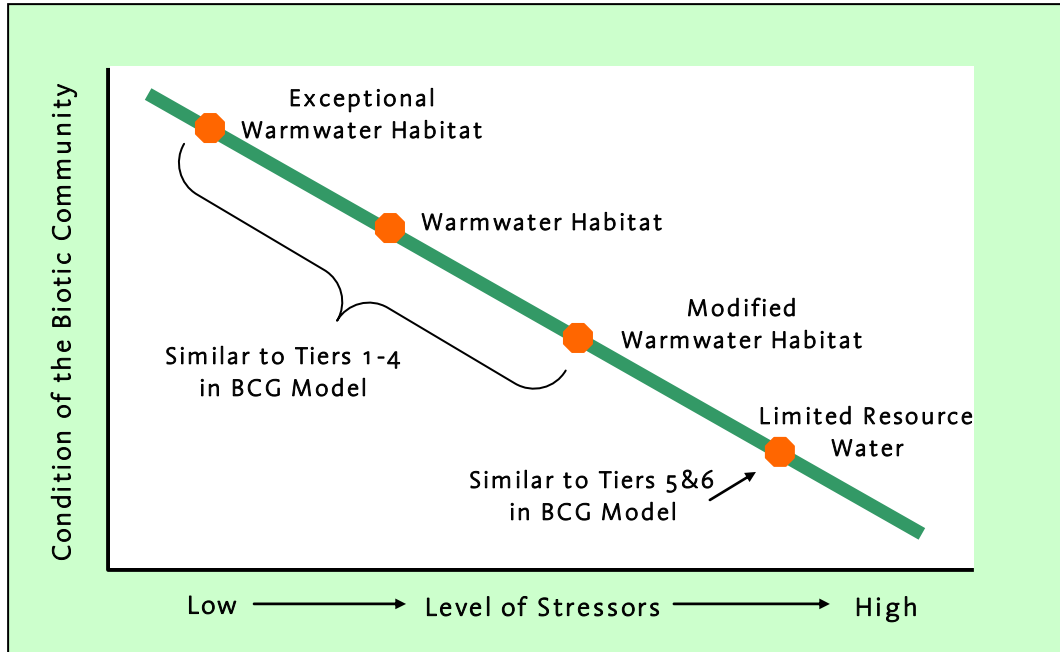


FIGURE 2. Warmwater Aquatic Life Use Designations in Ohio.

Exceptional Warmwater Habitat (EWH) is assigned to waters with unique and unusual assemblages of aquatic life. The Warmwater Habitat (WWH) designation applies to most of the state's rivers and streams. The Modified Warmwater Habitat (MWH) and Limited Resource Water (LRW) uses are applied to rivers and streams on which natural or non-remedial, human-caused conditions preclude attainment of a balanced warmwater aquatic community. The MWH and LRW uses may only be assigned following the completion of a Use Attainability Analysis (UAA) that demonstrates the WWH use cannot be met. These tiers represent the varying levels of biological condition that are attainable in the state. Actual numeric thresholds between tiers vary by physiogeographic region.

The warmwater use designations in Ohio also have several numeric water quality criteria that are specific to each TALU. Most notably, criteria for dissolved oxygen (Table 2) differ by use and in some cases, by region (OAC 3745-1-07, Table 7-1). These specific criteria reflect the varying level of water quality that is required to support the biota in each tier.

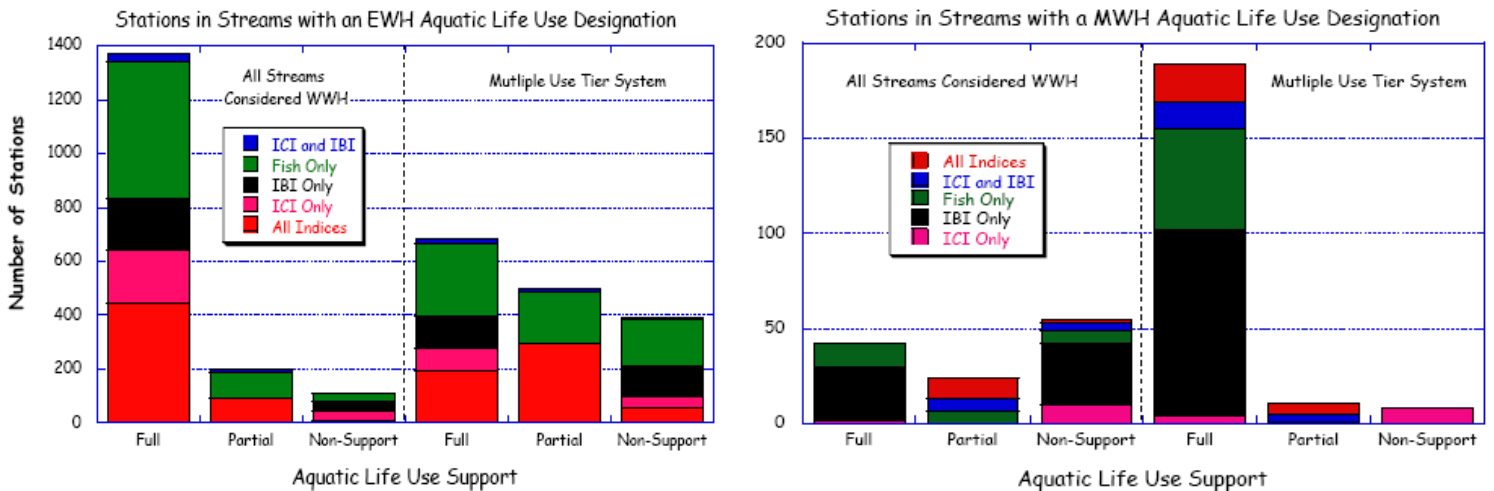
**TABLE 2.** Dissolved Oxygen Criteria in Ohio.

Use Tier (Name)	Dissolved Oxygen (Minimum)	Dissolved Oxygen (Average)
Exceptional WW Habitat	5	6
WW Habitat	4	5
Modified WW Habitat	3*	4
Limited Resource Water	2	3

\*Minimum dissolved oxygen in Huron/Erie Lake Plain (HELP) ecoregion is 2.5 mg/L.

The Center for Applied Bioassessment and Biocriteria (CABB) assessed use attainment in Ohio’s EWH and MWH waters under the current tiered use system and compared it to use attainment under a single warmwater aquatic life use designation. Researchers from CABB concluded that the tiered system more accurately reflected use attainment across habitats compared to a single use designation (CABB 2003). Specifically, CABB (2003) determined that:

- Waters evaluated presuming a single aquatic life use exhibited fewer impairments than the same waters evaluated under the presumption of a tiered system (Figure 3);
- A single use approach would generally be underprotective of EWH waters; and
- A single use approach mischaracterized attainment status of MWH waters and was likely over-protective.



**FIGURE 3.** Results from TALU Designation Evaluation Performed by CABB. (Adapted from CABB 2003).

## 2.2 The TALU Approach in Maine

The current TALU system in Maine began with the development of narrative biological standards for 4 aquatic life use classes. These use classifications are based on the BCG concept (Figure 4). Class AA waters are those in which the habitat is natural and free-flowing with naturally occurring aquatic life communities. The narrative biological standard for Class A waters is identical to Class AA except that Class A waters do not have to be free-flowing. The Class B use is assigned to those waters which have unimpaired habitat and water quality sufficient to support indigenous aquatic species. The lowest use, Class C, is applied to those waters whose habitat may be impaired but still maintains water quality sufficient to support indigenous aquatic species (USEPA 2005).

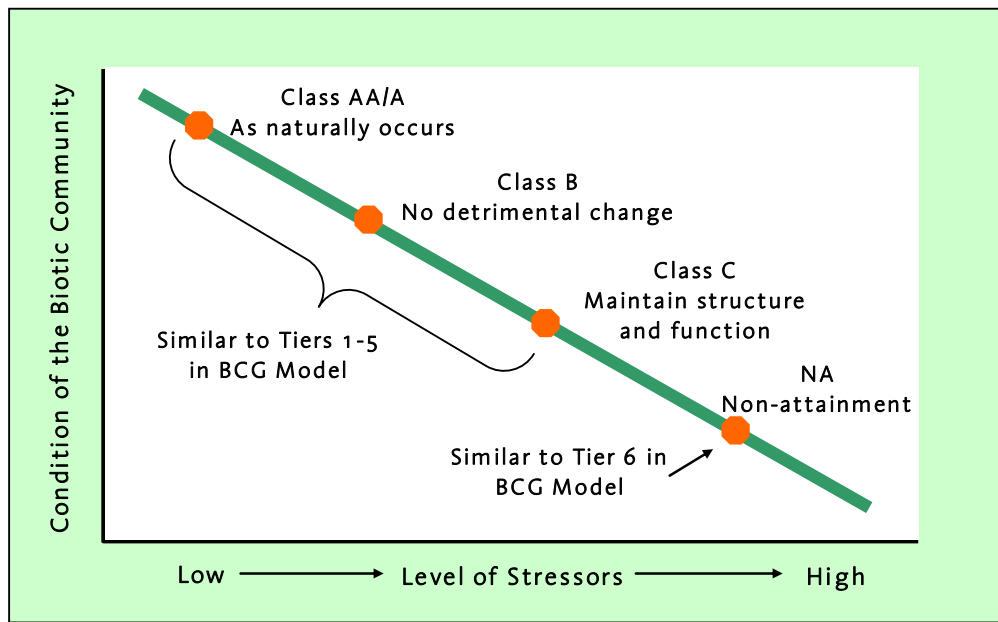


FIGURE 4. Tiered Aquatic Life Use Designations in Maine.

Maine’s narrative descriptions were later quantified with a probability-based statistical model developed from a set of baseline data collected by the staff at the Maine Department of Environmental Protection (MDEP) (Courtemanch 1995). The baseline data set consisted of 144 macroinvertebrate samples collected from streams across the state (USEPA 2005). Biologists at MDEP evaluated the samples according to 31 variables and assigned each sample to one of the 4 narrative use classes. From this evaluation, they were able to develop a linear discriminant model that is used to assign a TALU classification to the targeted waterbody based on biological data collected from the stream.

Maine’s TALU classifications are associated with specific dissolved oxygen and bacteria water quality criteria (MRSA Title 38 Section 465) (Table 3). Interestingly, the tiered use classifications were developed to be consistent with the tiered water quality criteria instead of the reverse (USEPA 2005).

MDEP designed the classifications around the tiered criteria because they reasoned that different levels of water quality would support different aquatic communities.

**TABLE 3.** Tier-Specific Aquatic Life Use Criteria in Maine.

Use Classification (name)	Dissolved Oxygen (mg/L)	(Saturation)	<i>E. Coli</i> * (col/100mL)
Class AA	Natural	Natural	Natural
Class A	7	75%	Natural
Class B	7	75%	64/427
Class C	5	60%	142/949

\*Geometric Mean/Instantaneous Maximum.

The TALU systems in Ohio and Maine are two examples of successful BCG implementation to protect biologic integrity. The TALUs in each of these programs are similar in that (USEPA 2005):

- The uses are ecologically based;
- The uses consider both structure and function of the aquatic community;
- Use attainment is judged according to numeric biocriteria developed from reference waterbodies; and
- The implementation of the TALUs integrates monitoring, assessment, and the state water quality standards.

It is clear that incorporation of the TALU approach within a Water Quality Standards framework meets biological integrity provisions of the Clean Water Act. In the following Sections, we provide a snapshot and discussion of how selected states are designating aquatic life uses.

### 3.0 REVIEW DISCUSSION

As part of the EWRAP task, MEC staff evaluated aquatic life use designations of thirteen states listed in Table 4 (excluding Missouri). States were chosen based on one or more of the following three attributes:

- 1) The state is in close proximity to Missouri;
- 2) The state has an established biological assessment program;
- 3) The state has diverse aquatic resources.

**TABLE 4.** States Evaluated for Aquatic Life Use Designations.

State	Criterion	State	Criterion
Kansas	1,2	Oklahoma	2
Iowa	1,2	Idaho	2
Nebraska	1,2	Wisconsin	2,3
Ohio	2	Kentucky	1,2
Maine	2	Washington	2
Arkansas	2,3	Oregon	2,3
Arizona	2		

### 3.1 Missouri Aquatic Life Use Designations

The state of Missouri does not implement a biologically tiered system. Currently, Missouri designates a waterbody as having one of the following aquatic life uses:

- Coldwater Fishery
- Coolwater Fishery
- General Warmwater Fishery
- Limited Warmwater Fishery

Missouri’s aquatic life uses are currently differentiated based on the presence of recreational fish communities and do not reflect the BCG. However, the MDNR bioassessment program has utilized draft numeric biocriteria to evaluate use attainment since the 1990s. Missouri has not formally adopted the numeric biocriteria into rule. Rather, MDNR protects aquatic life by applying general criteria such as 10 CSR 20.7-31(3)(G) which states that “Waters shall be free from physical, chemical, or hydrologic changes that would impair the biological community (Carnahan 2005).”

### 3.2 Use Designation Approaches in Other States

Three common approaches to aquatic life use designation identified across selected states that were:

- Habitat;
- Important fishery or fishery type; and
- Regional or Physiogeographic differences

Eleven of thirteen selected states are similar to Missouri in that aquatic life uses are based on habitat or fishery types (Table 5). Habitat based use classifications are generally those that are grouped according to water temperature and commonly consist of warm, cool, or cold water matrices. Fishery use classifications are those that protect a particular species or taxa, such as the Bull Trout designation in Idaho or the Warm Water Sport Fishery designation in Wisconsin. Several reviewed states assign a salmonid or trout use designation to protect cold water species. Regional or physiogeographic classifications are often used in combination other designation methods. For example, the state of Arkansas’ use designations are based on fishes expected to occur in a particular region. Although fishery or habitat classifications are a common designation approach, they do not represent a biologically tiered approach.

### 3.3 Review Summary

TALUs based on the BCG model are not widely implemented in the states that MEC evaluated. Of the 13 states reviewed, only Maine and Ohio utilize biologically tiered use designations (Table 5). At the time of this review, Iowa was in the process of refining their uses from a habitat based approach to more accurately reflect the BCG. More commonly, states implement alternate systems or combination of systems in designating aquatic life uses (Table 5).

**TABLE 5.** Predominant Aquatic Life Use Types for Selected States.

State	Basis for Use Designation				Other Uses		
	Habitat	Fishery	Regional	BCG	Lower Use	Higher Use	Effluent Dependent
Missouri	X	X			X		
Kansas	X				X		
Iowa	X	X			X		
Nebraska	X						
Ohio				X	X	X	
Maine				X		X	
Arkansas			X				
Arizona	X						X
Oklahoma	X	X			X		
Idaho	X	X			X		
Wisconsin	X	X			X		
Kentucky	X						
Washington		X*					
Oregon	X	X	X				

\*Use classifications not yet approved by EPA.

### 4.0 CONCLUSIONS

Data requirements for tiered designation approaches are relatively intensive and may explain why so few states have adopted the TALU approach. Long-term biological data are necessary to develop the numeric thresholds needed to position waters within appropriate tiers. All states evaluated as part of this project have established bioassessment programs, yet only two (Ohio and Maine) have established TALU designations in their WQS. Individual state information regarding aquatic life uses and the associated numeric criteria are available in Appendix A.

Based on data and information supplied to MEC by MDNR, Missouri likely has sufficient biomonitoring data to develop tiered biological uses for wadeable perennial streams within warm and coldwater habitats. Data collection for large rivers, lakes, and smaller ephemeral or intermittent waters lag behind wadeable streams.

## 5.0 REFERENCES

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Center for Applied Bioassessment and Biocriteria. 2003. Tiered Aquatic Life Uses and Comparison of Biological-Based Attainment/Impairment Measures: Single vs. Multiple Tiers. Fact Sheet Columbus, Ohio. Fact Sheet 1-CABB-03.

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USEPA (U.S. Environmental Protection Agency). 1994. *Water Quality Standards Handbook: Second Edition*. Office of Water, Washington, DC. EPA 823-B-94-005b

USEPA (U.S. Environmental Protection Agency) 2005. Use of Biological Information to Better Define Designated Aquatic Life Uses in State and Tribal Water Quality Standards: Tiered Aquatic Life Uses. Office of Science and Technology, Washington, DC. EPA 822-R-05-001.

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APPENDIX A

STATE AQUATIC LIFE USE DESIGNATION SUMMARIES

**Appendix A.1**  
**Kansas Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are somewhat tiered along a gradient of biological conditions although there are no thresholds included in the Kansas Water Quality Standards by which to differentiate them.

Kansas only has the term aquatic life support use as a use designation. This designation is further broken down into special, expected, and restricted aquatic life uses. The language from the water quality standards is as follows:

*Aquatic Life Support Use*

The use of a classified surface waters for the maintenance of the ecological integrity of streams, lakes, wetlands, and ponds, including the sustained growth and propagation of native aquatic life; naturalized, important, recreational aquatic life; and indigenous or migratory semiaquatic or terrestrial wildlife directly or indirectly dependent on surface waters other than stream segments for survival.

*Special Aquatic Life Use Waters*

Classified surface waters containing combinations of habitat types and indigenous biota not found commonly in the state or surface waters other than stream segments that contain representative populations of threatened or endangered species.

*Expected Aquatic Life Use Waters*

Classified surface waters containing habitat types and indigenous biota commonly found or expected in the state.

*Restricted Aquatic Life Use Waters*

Classified surface waters containing indigenous biota limited in abundance or diversity by the physical quality or availability of habitat, due to natural deficiencies or artificial modifications, compared to more suitable habitats in adjacent waters.

### Biological Criteria

Narrative:       Numeric:       None:

The State of Kansas does not have any biological criteria listed in their water quality standards.

### Use-Specific Criteria

Dissolved Oxygen:       Ammonia:       Other:       None:

The State of Kansas does not have any use-specific criteria.

### Information Sources

Kansas Water Quality Standards, KAR 28-16

Kansas Department of Health and Environment, Link to Supporting Documents  
<http://www.kdheks.gov/water/index.html#Adopted%20Regulations>

**Appendix A.2**  
**Iowa Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

Iowa recently revised their aquatic life use designations from habitat/fishery based uses to uses that more closely reflect a biological condition gradient although there is minimal discussion of the biologically relevant distinctions between each of the use categories. EPA has approved the new uses (February 2008) and they are now being implemented in the state.

*Cold Water Aquatic Life— Type 1 (Class B(CW1))*

Waters in which the temperature and flow are suitable for the maintenance of a variety of cold water species, including reproducing and nonreproducing populations of trout (*Salmonidae* family) and associated aquatic communities.

*Cold Water Aquatic Life— Type 2 (Class B(CW2))*

Waters that include small, channeled streams, headwaters, and spring runs that possess natural cold water attributes of temperature and flow. These waters usually do not support consistent populations of trout (*Salmonidae* family), but may support associated vertebrate and invertebrate organisms.

*Warm Water— Type 1 (Class B(WW-1))*

Waters in which temperature, flow and other habitat characteristics are suitable to maintain warm water game fish populations along with a resident aquatic community that includes a variety of native nongame fish and invertebrate species. These waters generally include border rivers, large interior rivers, and the lower segments of medium-size tributary streams.

*Warm Water— Type 2 (Class B(WW-2))*

Waters in which flow or other physical characteristics are capable of supporting a resident aquatic community that includes a variety of native nongame fish and invertebrate species. The flow and other physical characteristics limit the maintenance of warm water game fish populations. These waters generally consist of small perennially flowing streams.

*Warm Water— Type 3 (Class B(WW-3))*

Waters in which flow persists during periods when antecedent soil moisture and groundwater discharge levels are adequate; however, aquatic habitat typically consists of nonflowing pools during dry periods of the year. These waters generally include small streams of marginally perennial aquatic habitat status.

Such waters support a limited variety of native fish and invertebrate species that are adapted to survive in relatively harsh aquatic conditions.

*Lakes and Wetlands - (Class B(LW))*

These are artificial and natural impoundments with hydraulic retention times and other physical and chemical characteristics suitable to maintain a balanced community normally associated with lake-like conditions.

Iowa also has two use designations for “High Quality Waters” that are of biological or recreational significance.

**Biological Criteria**

Narrative:       Numeric:       None:

The State of Iowa does not include biological criteria in the state water quality standards however they do have substantial warm water and cold water aquatic life use attainability analysis guidance that include a biological assessment.

**Use-Specific Criteria**

Dissolved Oxygen:       Ammonia:       Other:       None:

The State of Iowa has use-specific dissolved oxygen, ammonia, temperature, and other toxics criteria. Below is a table of the dissolved oxygen criteria only. Other use specific criteria may be found in the state water quality standards.

	B(CW1)	B(CW2)	B(WW-1)	B(WW-2)	B(WW-3)	B(LW)
Minimum value for at least 16 hours of every 24-hour period	7.0	7.0	5.0	5.0	5.0	5*
Minimum value at any time during every 24-hour period	5.0	5.0	5.0	4.0	4.0	5*

*\*Applies only to the upper layer of stratification in lakes*

**Information Sources**

Iowa DNR News Release Regarding EPA Approval

[http://www.iowadnr.com/news/o8feb/epa\\_wq.html](http://www.iowadnr.com/news/o8feb/epa_wq.html)

Iowa Water Quality Standards Webpage

<http://www.iowadnr.com/water/standards/index.html>

Iowa Water Quality Standards, Iowa Administrative Code, Chapter 61

<http://www.iowadnr.com/water/standards/files/chapter61.pdf>

Iowa Use Attainability Assessment Procedures

<http://www.iowadnr.com/water/standards/files/warmwater.pdf>

<http://www.iowadnr.com/water/standards/files/o4cwp.pdf>

**Appendix A.3**  
**Nebraska Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations in Nebraska are based on water temperature. The State of Nebraska has four different classes of aquatic life use designations. They are: Warmwater A and B, Coldwater A and B. Nebraska uses narrative and general criteria to determine use attainments. There are biological criteria in the WQS. They are narrative and refer to a “key species” approach. A key species is an endangered, threatened, sensitive, or recreationally important aquatic species associated with a particular water body and its aquatic life use class. Key species are listed in the standards by basin.

*Warmwater*

These are waters which provide, or could provide, a habitat consisting of sufficient water volume or flow, water quality, and other characteristics such as substrate composition which are capable of maintaining year-round populations of warmwater biota. Warmwater biota are considered to be life forms in waters where temperatures frequently exceed 25°C (77°F).

*Warmwater Class A*

Waters that provide or have the potential to provide suitable habitat for maintaining one or more key species and are capable of maintaining year-round populations of a variety of other fish, organisms, and plants.

*Warmwater Class B*

These are waters in which habitat conditions limit aquatic life. These waters can only maintain tolerant warmwater fish and organisms year-round. Habitat conditions limit year-round support of key fish species.

*Coldwater*

These are waters which provide, or could provide, a habitat consisting of sufficient water volume or flow, water quality, and other characteristics such as substrate composition which are capable of maintaining year-round populations of coldwater biota. Coldwater biota are considered to be life forms in waters where temperatures seldom exceed 25°C (77°F).

*Coldwater Class A*

These waters provide habitat that support naturally reproducing salmonid populations year-round. They also support other coldwater organisms year-round.

*Coldwater Class B*

These waters provide or could provide habitat capable of maintaining year round salmonid populations. Habitat conditions in these waters limit natural reproduction of salmonids.

**Biological Criteria**

Narrative:       Numeric:       None:

The State of Nebraska has narrative biological criteria that utilize a “key species” approach. A key species is an endangered, threatened, sensitive, or recreationally important aquatic species associated with a particular water body and its aquatic life use class. Key species are listed in the state water quality standards by basin.

“Any human activity causing water pollution which would significantly degrade the biological integrity of a body of water or significantly impact or displace an identified “key species” shall not be allowed except as specified in Chapter 2.”

**Use-Specific Criteria**

Dissolved Oxygen:       Ammonia:       Other:       None:

The State of Nebraska has use-specific dissolved oxygen, ammonia, and metal/inorganics water quality criteria listed in their water quality standards. Dissolved oxygen criteria are listed below; see the state Water Quality Standards for the additional use-specific criteria.

Nebraska Dissolved Oxygen Criteria	
<u>Coldwater Class A</u>	
<b>June 1 - Sept. 30</b>	<b>October 1 - May 31</b>
4 mg/L 1-Day Minimum <sup>1</sup>	8 mg/L 1-Day Minimum <sup>2</sup>
5 mg/L 7-Day Mean Minimum	9.5 mg/L 7-day Mean <sup>1</sup>
6.5 mg/L 30-day Mean	
<u>Coldwater Class B</u>	
<b>April 1 - June 30</b>	<b>July 1 - March 31</b>
5 mg/L 1-Day Minimum <sup>3</sup>	4 mg/L 1-Day Minimum <sup>4</sup>
6.5 mg/L 7-Day Mean	5 mg/L 7-Day Mean <sup>3</sup>
	6.5 mg/L 30-Day Mean
<u>Warmwater Class A/B</u>	
<b>April 1 - Sept. 30</b>	<b>October 1 - March 31</b>
5 mg/L 1-Day Minimum <sup>5</sup>	3 mg/L 1-Day Minimum <sup>6</sup>
6.0 mg/L 7 Day Mean <sup>5</sup>	4 mg/L 7-Day Mean
	5.5 mg/L 30-Day Mean

<sup>1</sup> Salmonid Early Life Stages(SELS) Present

<sup>2</sup> All Life Stages Other Than SELS

<sup>3</sup> Coldwater Early Life Stages (CELS) Present

<sup>4</sup> All Life Stages Other Than CELS

<sup>5</sup> Early Life Stages (ELS) Present

<sup>6</sup> All Life Stages Other Than ELS

**Information Sources**

Nebraska Water Quality Standards, Nebraska Administrative Code, Title 117, Chapter 4

**Appendix A.4**  
**Ohio Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are based on regional Biological Condition Gradients.

The State of Ohio has seven different aquatic life classifications one of which (Limited Warmwater) is being phased out. Limited Resource Water and Modified Habitat Warmwater uses are designated only after a UAA shows irretrievable conditions (see page 4 of this report).

Use classifications are designated according to data gathered from biological assessments. Of the seven classifications, the warmwater uses exhibit the truest biological tiering.

*Exceptional Warmwater*

These are waters capable of supporting and maintaining an exceptional or unusual community of warmwater aquatic organisms having a species composition, diversity, and functional organization comparable to the seventy-fifth percentile of the identified reference sites on a statewide basis. The attributes of species composition, diversity and functional organization will be measured using the index of biotic integrity, the modified index of well-being and the invertebrate community index as defined in "Biological Criteria for the Protection of Aquatic Life: Volume II, Users Manual for Biological Field Assessment of Ohio Surface Waters."

*Warmwater*

These waters are capable of supporting and maintaining warm water communities comparable to the twenty-fifth percentile of the identified reference sites within an ecoregion. For all ecoregions, the attributes of species composition, diversity and functional organization will be measured using the index of biotic integrity, the modified index of well-being and the invertebrate community index as defined in "Biological Criteria for the Protection of Aquatic Life: Volume II, Users Manual for Biological Field Assessment of Ohio Surface Waters."

*Limited Warmwater*

These are waters that were temporarily designated in the 1978 water quality standards as not meeting specific warmwater habitat criteria. Criteria for the support of this use designation are the same as the criteria for the support of the use designation warmwater habitat. However, individual criteria are varied on a case-by-case basis and supersede the criteria for warmwater habitat where applicable.

Any exceptions from warmwater habitat criteria apply only to specific criteria during specified time periods and/or flow conditions. The adjusted criteria and conditions for specified stream segments are denoted as comments in rules 3745-1-08 to 3745-1-30 of the Administrative Code. Stream segments currently designated limited warmwater habitats will undergo use attainability analyses and will be redesignated other aquatic life habitats. No additional stream segments will be designated limited warmwater habitats.

#### *Modified Warmwater*

These are waters that have been the subject of a use attainability analysis and have been found to be incapable of supporting and maintaining a balanced, integrated, adaptive community of warmwater organisms due to irretrievable modifications of the physical habitat. Such modifications are of a long-lasting duration (i.e., twenty years or longer) and may include the following examples: extensive stream channel modification activities permitted under sections 401 and 404 of the act or Chapter 6131. of the Revised Code, extensive sedimentation resulting from abandoned mine land runoff, and extensive permanent impoundment of free-flowing water bodies. The attributes of species composition, diversity and functional organization will be measured using the index of biotic integrity, the modified index of well-being and the invertebrate community index as defined in "Biological Criteria for the Protection of Aquatic Life: Volume II, Users Manual for Biological Field Assessment of Ohio Surface Waters."

#### *Seasonal Salmonid*

These are rivers, streams and embayments capable of supporting the passage of salmonids from October to May and are water bodies large enough to support recreational fishing. This use will be in effect the months of October to May. Another aquatic life habitat use designation will be enforced the remainder of the year (June to September).

#### *Coldwater*

This classification is for waters that have characteristics associated with inland trout streams and/or native fauna.

#### *Limited Resource Water*

These are waters that have been the subject of a use attainability analysis and have been found to lack the potential for any resemblance of any other aquatic life habitat as determined by the biological criteria. The use attainability analysis must demonstrate that the extant fauna is substantially degraded and that the potential for recovery of the fauna to the level characteristic of any other aquatic life habitat is realistically precluded due to natural background conditions or irretrievable human-induced conditions. Furthermore, one or more "causative factors" listed in 3745-1-07(B)(1)(g) of the WQS must be assigned to these waters.

**Biological Criteria**

Narrative:       Numeric:       None:

Ohio uses both narrative and numeric criteria to protect designated aquatic life uses. Narrative criteria are contained in OAC 3745-01-07(A)(6). The State of Ohio uses a multiple biologic indices in order to develop regional biological criteria for different stream types. The full table (Table 7-15) of biological criteria may be found in the water quality standards. Below is a table showing of biological criteria from one region in Ohio.

	Huron/Erie Lake Plain		
	Modified WW	WW Habitat	Exceptional WW
<b>Index of Biotic Integrity</b>			
Wading Sites	22	32	50
Boat Sites	20-22	34	48
Headwater Sites	20	28	50
<b>Modified Index of Well-Being</b>			
Wading Sites	5.6	7.3	9.4
Boat Sites	5.7	8.6	9.6
<b>Invertebrate Community Index</b>			
Artificial Substrate Samplers	22	34	46

**Use-Specific Criteria**

Dissolved Oxygen:       Ammonia:       Other:       None:

The State of Ohio has use specific water quality criteria for dissolved oxygen, ammonia, chlorine, pH, and temperature. Dissolved oxygen criteria are listed below; see the state Water Quality Standards for the additional use-specific criteria.

**Ohio Dissolved Oxygen Criteria**

Aquatic Life Use (name)	Minimum (mg/L)	Minimum 24- hour Average (mg/L)
Warmwater	4	5
Exceptional Warmwater	5	6
Modified Warmwater	3	4
Coldwater	6	7
Limited Resource Water	2	3

**Information Sources**

Ohio Water Quality Standards, Ohio Administrative Code 3745-1

<http://www.epa.state.oh.us/dsw/rules/3745-1.html>

**Appendix A.5**  
**Maine Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are based on the Biological Condition Gradient model.

*Class AA Waters*

These waters are the highest classification and are outstanding natural resources. These waters are suitable for the designated uses of drinking water after disinfection, fishing, recreation in and on the water and navigation and as habitat for fish and other aquatic life. The habitat is characterized as free flowing and natural. Aquatic life, dissolved oxygen, and bacteria levels are as naturally occurs.

*Class A Waters*

These waters are of such quality that they are suitable for the designated uses of drinking water after disinfection; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as habitat for fish and other aquatic life. The habitat must be characterized as natural. Dissolved oxygen must be 7.0 mg/L or 75% saturated, whichever is higher. Aquatic life and bacteria levels are as naturally occurs.

*Class B Waters*

Class B waters must be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as habitat for fish and other aquatic life. The habitat must be characterized as unimpaired.

*Class C Waters*

Class C waters must be of such quality that they are suitable for the designated uses of drinking water supply after treatment; fishing; agriculture; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; navigation; and as a habitat for fish and other aquatic life.

**Biological Criteria**

Narrative:       Numeric:       None:

The narrative biological criteria for the State of Maine are included in the use descriptions above. Maine does not include numeric criteria in the state water quality standards but it is the only state in this review that uses a linear discriminant model based on a reference stream bioassessment database to assess use attainment.

**Use-Specific Criteria**

Dissolved Oxygen:       Ammonia:       Other:       None:

The State of Maine has use-specific dissolved oxygen and bacteria.

	<b>Dissolved Oxygen Numeric Criteria</b>	<b>Bacteria (<i>E. coli</i>) Numeric Criteria</b>	<b>Habitat Narrative Criteria</b>	<b>Aquatic Life (Biological) Narrative Criteria</b>
<b>Class AA</b>	as naturally occurs	as naturally occurs	free flowing and natural	No direct discharge of pollutants; <i>as naturally occurs</i>
<b>Class A</b>	7 ppm; 75% saturation	as naturally occurs	natural	<i>as naturally occurs</i>
<b>Class B</b>	7 ppm; 75% saturation	64/100 ml (g.m.*) or 427/100 ml (inst.*)	unimpaired	Discharges <i>shall not cause adverse impact</i> to aquatic life in that the receiving waters shall be of sufficient quality to <i>support all aquatic species indigenous to the receiving water without detrimental changes to the resident biological community.</i>
<b>Class C</b>	5 ppm; 60% saturation	142/100 ml (g.m.*) or 949/100 ml (inst.*)	habitat for fish and other aquatic life	Discharges <i>may cause some changes</i> to aquatic life, provided that the receiving waters shall be of sufficient quality to <i>support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community.</i>

\*g.m., geometric mean; inst., instantaneous level

**Information Sources**

Maine Water Quality Standards, Maine Revised Statutes, Title 38, Chapter 3, Subchapter 1, Article 4A <http://janus.state.me.us/legis/statutes/38/title38ch3seco.html>

Davies S.P., and S.K. Jackson. 2006. The biological condition gradient: a descriptive model for interpreting change in aquatic ecosystems. *Ecological Applications*. 16(4) 1251-1266.

USEPA (U.S. Environmental Protection Agency 2005. Use of Biological Information to Better Define Designated Aquatic Life Uses in State and Tribal Water Quality Standards: Tiered Aquatic Life Uses. US EPA Office of Science and Technology, Washington, DC. EPA 822-R-05-001.

**Appendix A.5**  
**Arkansas Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The State of Arkansas divides the fisheries beneficial use into three categories: trout, lakes, and streams. The streams category is further divided by region and each region has fish species listed in the standards that are typically representative of the region (key species and indicator species).

Fisheries

Trout

Lakes

Streams

Ozark Highlands Ecoregion

Boston Mountains Ecoregion

Arkansas River Valley

Ouachita Mountains Ecoregion

Typical Gulf Coastal Ecoregion

Springwater Influenced Gulf Coastal Ecoregion

Least Altered Delta Ecoregion

Channel Altered Delta Ecoregion – w/example of species list

**Key Species**

Blacktail shiner

Drum

Carp

Channel catfish

Green sunfish

Spotted gar

**Indicator Species**

Mosquitofish

Gizzard shad

Emerald shiner

**Biological Criteria**

Narrative:  Numeric:  None:

The State of Arkansas does include narrative criteria to protect biological integrity in their water quality standards document. Regulation 2.405 is as follows:

“For all waters with specific fisheries use designated in Appendix A, aquatic biota should not be impacted. Aquatic biota should be representative of streams that have the ability to support the designated fishery, taking into consideration the seasonal and natural variability of the aquatic biota community under naturally varying habitat and hydrological conditions; the technical and economic feasibility of the options

available to address the relevant conditions; and other factors. An aquatic biota assessment should compare biota communities that are similar in variety and abundance, based upon either an in-stream study including an upstream and downstream comparison, a comparison to a reference water body within the same ecoregion, or a comparison to community characteristics from a composite of reference waters. The reference stream should have similar habitat and hydrologic conditions. Such a comparison should consider the seasonal and natural variability of the aquatic biota community. It is the responsibility of the Department to collect and evaluate the data for an aquatic biota assessment and such data will not be used to develop or impose permit limits.”

**Use-Specific Criteria**

Dissolved Oxygen:  Ammonia:  Other:  None:

The State of Arkansas has use-specific/ecoregion-specific dissolved oxygen, turbidity, temperature, and pH water quality criteria.

The dissolved oxygen criteria were developed by the Arkansas Department of Pollution Control and Ecology following a statewide assessment of regional reference stream conditions. The statewide assessment included the collection of physical, chemical, and biological data during two, one-week long sampling efforts (one Spring, one Summer) at multiple reference sites in the various ecoregions. Dissolved oxygen was measured continuously during each of the two assessments. The dissolved oxygen criteria in the current Water Quality Standards are based on the results of that study (Bennett et al. 1987, Giese et al. 1987).

**Dissolved Oxygen Criteria in mg/L for Arkansas Ecoregions - Primary (Critical)**

Ecoregion	Watershed Area			
	< 10 mi <sup>2</sup>	10 - 100 mi <sup>2</sup>	> 100 mi <sup>2</sup>	
Ozark Highlands	6 (2)	6 (5)	6 (6)	
Delta (Least and Channel-Altered)	5 (2)	5 (3)	5 (5)	
	< 10 mi <sup>2</sup>	10 - 150 mi <sup>2</sup>	151 - 400 mi <sup>2</sup>	> 400 mi <sup>2</sup>
Arkansas River Valley	5 (2)	5 (3)	5 (4)	5 (5)
	< 10 mi <sup>2</sup>	10 - 500 mi <sup>2</sup>	> 500 mi <sup>2</sup>	
Typical Gulf Coast	5 (2)	5 (3)	5 (5)	
	< 10 mi <sup>2</sup>	> 10 mi <sup>2</sup>		
Ouachita Mountains	6 (2)	6 (6)		
Boston Mountains	6 (2)	6 (6)		
All Watersheds				
Springwater-influenced Gulf Coastal	6 (5)			
Trout	6 (6)			

Critical season: That period of the year when water temperatures exceed 22°C. This is normally the hot, dry season and after the majority of the fish spawning activities have ceased. This season occurs during a different time frame in different parts of the state, but normally exists from about mid-May to mid-September.

Primary season: That period of the year when water temperatures are 22°C or below. This includes the major part of the year from fall through spring, including the spawning season of most fishes. It normally occurs from about mid-September to mid-May.

For purposes of determining effluent limits, a 1 mg/l diurnal depression below the applicable critical dissolved oxygen criterion is allowed when water temperatures exceed 22°C for no more than 8 hours during any 24-hour period.

Ecoregion/Basin	Turbidity	Temperature	pH <sup>1</sup>
	Primary (Stormflow)	°C	SU
Ozark Highlands	10 (17)	29	6.0 - 9.0
Boston Mountains	10 (19)	31	6.0 - 9.0
Arkansas River Valley	21 (40)	31	6.0 - 9.0
Ouachita Mountains	10 (18)	30	6.0 - 9.0
Springwater-influenced Gulf Coastal	21 (32)	30	6.0 - 9.0
Typical Gulf Coastal	21 (32)	30	6.0 - 9.0
Least-Altered Delta	45 (84)	30	6.0 - 9.0
Channel-Altered Delta	75 (250)	32	6.0 - 9.0
Arkansas River	50 (52)	32	6.0 - 9.0
Mississippi River	50 (75)	32	6.0 - 9.0
Red River	50 (150)	32	6.0 - 9.0
St. Francis River	75 (100)	32	6.0 - 9.0
Trout	10 (15)	20	6.0 - 9.0

<sup>1</sup> - As a result of waste discharges, the pH of water in streams or lakes must not fluctuate in excess of 1.0 unit over a period of 24 hours and pH values shall not be below 6.0 or above 9.0.

## Information Sources

Bennett, C., Giese, J., Keith, B., Maner, M., McDaniel, R., O'Shaughnessy, N., and B. Singleton. 1987. Physical, Chemical, and Biological Characteristics of Least-Disturbed Reference Streams in Arkansas' Ecoregions – Volume I Data Compilation. Arkansas Department of Pollution Control and Ecology.

Giese, J., Keith, B., Maner, M., McDaniel, R., and B. Singleton. 1987. Physical, Chemical, and Biological Characteristics of Least-Disturbed Reference Streams in Arkansas' Ecoregions – Volume II Data Analysis. Arkansas Department of Pollution Control and Ecology.

Arkansas Surface Water Quality Standards, Arkansas Pollution Control and Ecology Regulation 2 [http://www.adeq.state.ar.us/regs/files/reg02\\_final\\_071125.pdf](http://www.adeq.state.ar.us/regs/files/reg02_final_071125.pdf)

Other Informational Documents [http://www.adeq.state.ar.us/water/reports\\_data.htm](http://www.adeq.state.ar.us/water/reports_data.htm)

**Appendix A.7**  
**Arizona Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are based on water temperature.

The State of Arizona has 4 aquatic life use designation categories. They are:

- 1) Aquatic and Wildlife Coldwater;
- 2) Aquatic and Wildlife Warmwater;
- 3) Aquatic and Wildlife Ephemeral;
- 4) and Aquatic and Wildlife Effluent-Dependent.

For tributaries that are not listed in Appendix B of the water quality standards, the following uses apply:

- The Aquatic and Wildlife Ephemeral use applies to an unlisted tributary that is an ephemeral water;
- The Aquatic and Wildlife Cold Water use applies to an unlisted tributary that is a perennial or intermittent surface water and is above 5000 feet in elevation; and
- The Aquatic and Wildlife Warm Water use applies to an unlisted tributary that is a perennial or intermittent surface water and is below 5000 feet in elevation.

The water quality standards state that the Director must classify a surface water as an effluent-dependent water by rule and that he may adopt site-specific water quality standards for an effluent-dependent water by rule. The standards also state that the Director may allow a discharge into a stream if it creates or supports an ecologically valuable ecosystem (called a net ecological benefit in standards).

**Biological Criteria**

Narrative:  Numeric:  None:

The State of Arizona has proposed numeric biocriteria based on the 25<sup>th</sup> percentile of reference stream data for both warm and coldwater aquatic life uses. It appears as though these criteria are still in draft form and have not yet been adopted into the state water quality standards.

**Use-Specific Criteria**

Dissolved Oxygen:  Ammonia:  Other:  None:

The State of Arizona has use-specific pH, temperature, suspended sediment, and dissolved oxygen criteria.

	pH	Max. Temperature Increase	Max. Sus. Sediment <sup>1</sup>	Dissolved Oxygen <sup>2</sup>
<b>AW Warm</b>	6.5 - 9	3 C	80 mg/L	6.0 mg/L or at least 90% of saturation
<b>AW Cold</b>	6.5 - 9	1 C	80 mg/L	7.0 mg/L or at least 90% of saturation
<b>AW Ephemeral<sup>4</sup></b>	6.5 - 9			
<b>AW Eff. Dependent<sup>3</sup></b>	6.5 - 9	1 C		3.0 mg/L - Three hours after sunrise to sunset 1.0 mg/L - Sunset to three hours after sunrise or at least 90% of saturation

1 - Geometric mean 4 sample minimum at baseflow  
 2 - Single sample minimum  
 3 - Classified by rule, director may apply site-specific criteria  
 4 - Protected from acute toxicity

**Information Sources**

Arizona Administrative Code Title 18 Chapter 11  
[http://www.azsos.gov/public\\_services/Title\\_18/18-11.htm](http://www.azsos.gov/public_services/Title_18/18-11.htm)

**Appendix A.8**  
**Oklahoma Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are based water temperature and fishery type.

Aquatic life uses are given the default designation (Warm Water Aquatic Community) unless a UAA shows that it should be designated otherwise.

The fish and wildlife propagation beneficial use is divided into 4 categories in Oklahoma. They are:

*Habitat Limited Aquatic Community*

This beneficial use is determined after a UAA demonstrates that the waterbody cannot fully support a warm water aquatic community.

*Warm Water Aquatic Community (Default Category)*

This use is assigned when habitat and water quality are adequate to support warm water climax fish communities.

*Cool Water Aquatic Community – Excluding lakes*

This is a subcategory of the beneficial use category "Fish and Wildlife Propagation" where the water quality, water temperature and habitat are adequate to support cool water climax fish communities and includes an environment suitable for the full range of cool water benthos. Typical species may include smallmouth bass, certain darters and stoneflies.

*Trout Fishery*

This is a subcategory of the beneficial use where the water quality, water temperature and habitat are adequate to support a seasonal put and take trout fishery.

**Biological Criteria**

Narrative:  Numeric:  None:

Oklahoma has narrative biocriteria that state that aquatic life should not exhibit degraded conditions as compared to regional reference conditions or to historical data from the same waterbody. Specific numeric biological criteria are not included in the state water quality standards.

**Use-Specific Criteria**

Dissolved Oxygen:  Ammonia:  Other:  None:

The State of Oklahoma has use specific water quality criteria for dissolved oxygen, temperature, and turbidity.

Use Designation	Applicable Dates	Dissolved Oxygen Minimum	Temperature
<b>Habitat Limited Aquatic Community</b>			
Early Life Stages	4/1 - 6/15	4.0	25
Other Life Stages			
Summer Conditions	6/16 - 10/15	3.0	32
Winter Conditions	10/16 - 3/31	3.0	18
<b>Warm Water Aquatic Community</b>			
Early Life Stages	4/1 - 6/15	6.0 <sup>1</sup>	25
Other Life Stages			
Summer Conditions	6/16 - 10/15	5.0 <sup>1</sup>	32
Winter Conditions	10/16 - 3/31	5.0	18
<b>Cool Water Aquatic Community/Trout</b>			
Early Life Stages	3/1 - 5/31	7.0 <sup>1</sup>	22
Other Life Stages			
Summer Conditions	6/1 - 10/15	6.0 <sup>1</sup>	29
Winter Conditions	10/16 - 2/28	6.0	18

<sup>1</sup> Due to natural diurnal dissolved oxygen fluctuations, a 1.0 mg/L dissolved oxygen concentration deficit is allowed for no more than 8 hours during any 24-hour period.

**Information Sources**

Oklahoma Water Quality Standards, Oklahoma Administrative Code, Title 785, Chapter 45. <http://www.oar.state.ok.us>

Oklahoma Water Quality Standards Implementation, Oklahoma Administrative Code, Title 252, Chapter 690. <http://www.deq.state.ok.us/rules/690.pdf>

**Appendix A.9**  
**Idaho Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are based on fisheries type.

The following are the five aquatic life use designations listed in the state water quality standards are:

*Cold Water*

This classification is applied when the water quality is appropriate for the protection and maintenance of a viable aquatic life community for coldwater species.

*Salmonid Spawning*

This classification is used in waters that provide or could provide a habitat for active self propagating populations of salmonid fishes.

*Seasonal Cold Water*

This is used when the water quality is appropriate for the protection and maintenance of a viable aquatic life community of cool and cold water species, where cold water aquatic life may be absent during, or tolerant of, seasonally warm temperatures.

*Warm Water*

This is used when the water quality is appropriate for the protection and maintenance of a viable aquatic life community for warm water species.

*Modified*

This is applied when the water quality is appropriate for an aquatic life community that is limited due to one or more conditions that preclude attainment of reference streams or conditions.

The Idaho Department of Environmental Quality (IDEQ) also has a Bull Trout use designation that is a subcategory of the Cold Water use. The Bull Trout use applies only to specific watersheds in the state.

**Biological Criteria**

Narrative:  Numeric:  None:

The State of Idaho does not include any biological criteria in the general or numeric criteria sections of their water quality standards. However, Section 053 of the

standards state that aquatic habitat parameters, biological parameters, and natural conditions should be considered when assessing use attainment. Additionally, the department may give less weight to pH, turbidity, dissolved oxygen, and temperature criteria if aquatic habitat and biological data indicate to the assessor that aquatic life beneficial uses are otherwise supported. IDEQ provides substantial guidance for determining beneficial use support through biological monitoring.

**Use-Specific Criteria**

Dissolved Oxygen:  Ammonia:  Other:  None:

The State of Idaho has use-specific dissolved oxygen, ammonia, temperature, and turbidity water quality criteria.

Metric	Warm Water	Seasonal Cold Water	Cold Water	Salmonid Spawning	Bull Trout
MDMT	33 °C	26 °C	22 °C	13 °C	N/A
MWMT	N/A	N/A	N/A	N/A	13 °C
MDAT	29 °C	23 °C	19 °C	9 °C	N/A

MDMT - Maximum Daily Maximum Temperature

MWMT - Maximum Weekly (7-day average) Maximum Temperature

MDAT - Maximum Daily Average Temperature

	DO	Turbidity	Ammonia
<b>Bull Trout</b>	same as CW	same as CW	same as CW
<b>Cold Water</b>	> 6 mg/L at all times	No greater than 50 NTU (instantaneous) of background <sup>1</sup> No greater than 25 NTU of background for 10 consecutive days <sup>1</sup>	Specific formula in standards based on Temperature and pH
<b>Cold Water -Sal. Spawning</b>	1-day minimum 5 mg/L, 7-day average 6 mg/L <sup>2</sup> 1-day minimum not less than 6 mg/L or 90% of saturation		Specific formula in standards based on Temperature and pH
<b>Seasonal Cold Water<sup>3</sup></b>	> 6 mg/L at all times		Specific formula in standards based on Temperature and pH
<b>Warm Water</b>	Exceeding 5 mg/L at all times		Specific formula in standards based on Temperature and pH
<b>Modified</b>	Case-by-Case	Case-by-Case	Case-by-Case

1 - Below mixing zone

2 - Intergravel O<sub>2</sub>

3 - Between summer solstice and autumn equinox

**Information Sources**

Idaho Administrative Code, Department of Environmental Quality, Water Quality Standards, IDAPA 58.01.02

[http://www.deq.state.id.us/water/data\\_reports/surface\\_water/monitoring/standards.cfm](http://www.deq.state.id.us/water/data_reports/surface_water/monitoring/standards.cfm)

Link to Surface Water Monitoring Documents

[http://www.deq.state.id.us/water/data\\_reports/surface\\_water/monitoring/overview.cfm](http://www.deq.state.id.us/water/data_reports/surface_water/monitoring/overview.cfm)

**Appendix A.10**  
**Wisconsin Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The State of Wisconsin has 5 aquatic life categories however, only the Cold Water, Warm Water Sport Fish, and Warm Water Forage Fish uses are considered suitable for the protection and propagation of fish and wildlife communities.

*Cold Water Communities*

This subcategory includes surface waters capable of supporting a community of cold water fish and other aquatic life, or serving as a spawning area for cold water fish species. This subcategory includes, but is not restricted to, surface waters identified as trout water by the department of natural resources (Wisconsin Trout Streams, publication 6–3600 (80)).

*Warm Water Sport Fish Communities*

This subcategory includes surface waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish.

*Warm Water Forage Fish Communities*

This subcategory includes surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.

*Limited Forage Fish Communities (Intermediate surface waters)*

This subcategory includes surface waters of limited capacity and naturally poor water quality or habitat. These surface waters are capable of supporting only a limited community of forage fish and other aquatic life.

*Limited Aquatic Life Communities (Marginal surface waters)*

This subcategory includes surface waters of severely limited capacity and naturally poor water quality or habitat. These surface waters are capable of supporting only a limited community of aquatic life.

According to the document entitled “Guidelines for Designating Fish and Aquatic Life Uses for Wisconsin Surface Waters,” the State of Wisconsin is pursuing the development of 17 sub-categories of the aquatic life uses listed above. Until those sub-categories are officially included in the Wisconsin Administrative Code, the 5 uses above will apply.

### Biological Criteria

Narrative:       Numeric:       None:

The State of Wisconsin does not include biological criteria in the state water quality standards.

### Use-Specific Criteria

Dissolved Oxygen:       Ammonia:       Other:       None:

In Cold Water Communities, no significant artificial increases in water temperature are allowed where trout reproduction is protected. Temperature may not exceed 89°F for warm water fishes.

Use	Dissolved Oxygen Minimum
Cold Water Communities	6.0 <sup>1</sup>
Warm Water Forage Fish Communities	5.0
Warm Water Sport Fish Communities	5.0
Limited Forage Fish Communities	3.0
Limited Aquatic Life Communities	1.0

<sup>1</sup> 7.0 mg/L during spawning season.

### Information Sources

Ball, J. and P. LaLiberte. 2004. Guidelines for Designating Fish and Aquatic Life Uses for Wisconsin Surface Waters. Wisconsin Department of Natural Resource, Bureau of Watershed Management. Madison, Wisconsin. PUBL-WT-807-04.

Wisconsin Water Quality Standards, Wisconsin Administrative Code, Chapters NR 102, 104, and 105.

**Appendix A.11**  
**Kentucky Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are based on water temperature. The two uses are:

*Warm Water Aquatic Life*  
*Cold Water Aquatic Life*

**Biological Criteria**

Narrative:  Numeric:  None:

The State of Kentucky does not have true biological criteria in their water quality standards.

**Use-Specific Criteria**

Dissolved Oxygen:  Ammonia:  Other:  None:

The State of Kentucky has use-specific temperature, dissolved oxygen, alkalinity, and flow criteria.

	Temperatue	Dissolved Oxygen	Alkalinity	Flow
<b>Warm Water</b>	Shall not exceed 31.7 C, Site specific temp. allowed	Minimum 5.0 mg/L daily average, Instantaneous minimum 4.0 mg/L	Natural alk. may not be reduced by more than 25%, If natural alk. < 20 mg/L CaCO <sub>3</sub> then no reduction allowed	May not be altered to the degree that aquatic life are adversely affected
<b>Cold Water</b>	Shall not be increased above natural levels	Minimum 6.0 mg/L daily average, Instantaneous minimum 5.0 mg/L	-----	-----

**Information Sources**

<http://www.lrc.ky.gov/kar/title401.htm>

**Appendix A.12**  
**Washington Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are primarily based on fishery type.

*Char Spawning and Rearing*

The key identifying characteristics of this use are spawning or early juvenile rearing by native char (bull trout and Dolly Varden), or use by other aquatic species similarly dependent on such cold water. Other common characteristic aquatic life uses for waters in this category include summer foraging and migration of native char; and spawning, rearing, and migration by other salmonid species.

*Core Summer Salmonid Habitat*

The key identifying characteristics of this use are summer (June 15 - September 15) salmonid spawning or emergence, or adult holding; use as important summer rearing habitat by one or more salmonids; or foraging by adult and subadult native char. Other common characteristic aquatic life uses for waters in this category include spawning outside of the summer season, rearing, and migration by salmonids.

*Salmonid Spawning, Rearing, and Migration*

The key identifying characteristic of this use is salmon or trout spawning and emergence that only occurs outside of the summer season (September 16 - June 14). Other common characteristic aquatic life uses for waters in this category include rearing and migration by salmonids.

*Salmonid Rearing and Migration Only*

The key identifying characteristic of this use is use only for rearing or migration by salmonids (not used for spawning).

*Non-Anadromous Interior Redband Trout*

For the protection of waters where the only trout species is a non-anadromous form of self-reproducing interior redband trout (*O. mykiss*), and other associated aquatic life.

*Indigenous Warm Water Species*

For the protection of waters where the dominant species under natural conditions would be temperature tolerant indigenous nonsalmonid species. Examples include dace, redband shiner, chiselmouth, sucker, and northern pikeminnow.

**Biological Criteria**

Narrative:       Numeric:       None:

The State of Washington does not include biological criteria in their water quality standards.

**Use-Specific Criteria**

Dissolved Oxygen:       Ammonia:       Other:       None:

The State of Washington has use-specific criteria for dissolved oxygen, temperature, and turbidity. Use specific turbidity criteria may be found in the state water quality standards.

Use Designation	Char Spawning and Rearing	Core Summer Salmonid Habitat	Salmonid Spawning, Rearing, and Migration	Salmonid Rearing and Migration Only	Non-Anadromous Interior Redband Trout	Indigenous Warm Water Species
Dissolved Oxygen (Daily Minimum)	9.5	9.5	8	6.5	8	6.5
Temperature <sup>1</sup> (Celsius)	12.0 <sup>2</sup>	16.0	17.5	17.5	18.0	20.0

<sup>1</sup> 7-day average of maximum daily temperatures.

<sup>2</sup> Criteria is 9 for Char Spawning only.

**Information Sources**

Washington Water Quality Standards, Washington Administrative Code, Title 173, Chapter 173-201A  
<http://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A>

Washington Department of Ecology,  
<http://www.ecy.wa.gov/programs/wq/swqs/index.html>

**Appendix A.13**  
**Oregon Aquatic Life Use Information**  
(As of 3/31/08)

**Aquatic Life Use Designations**

Basis for Use Development:

Biological:  Fishery:  Habitat:  Physiogeographic:  Other:

The aquatic life use designations are divided by river basin and are based on water temperature and fishery type. For example, in the North Coast -Lower Columbia Basin, the aquatic uses are: anadromous fish passage, salmonid fish rearing, salmonid fish spawning, and resident fish and aquatic life.

*Bull Trout Juvenile Rearing and Spawning*

The Bull trout juvenile rearing and spawning use was designated based on the Idaho Department of Environmental Quality's (IDEQ) "Bull Trout Habitat Designation Report: Technical Work Group Recommendations" (2003). IDEQ believes it is necessary and appropriate to designate areas identified as potential bull trout rearing and spawning habitat (identified in both of the above reports) in addition to where current use occurs because bull trout habitat in the State has been greatly reduced and fragmented, and because bull trout are listed under the federal Endangered Species Act (ESA). The additional habitat will allow local populations to grow to the point they: (1) are reconnected with other local populations and with foraging habitats, (2) are large enough to withstand losses due to natural stresses and events (e.g., drought); and (3) maintain the genetic diversity to support a viable population.

*Core Cold Water Habitat*

Core cold-water habitat designations identify and ensure the protection of colder water habitats that provide more optimal conditions for salmon and steelhead juvenile rearing and that protect summer bull trout sub-adult and adult foraging and migration. In addition, these areas would provide colder holding waters for pre-spawning adults.

*Salmon and Trout Juvenile Rearing and Migration*

DEQ proposes to designate "Salmon and Trout Rearing and Migration Use" for waters where:

1. salmon or steelhead rearing occurs in July or August;
2. rainbow or coastal cutthroat trout rearing occurs; and
3. all waters upstream of the waters identified above.

*Salmon and Steelhead Migration Corridors*

DEQ proposes to designate waters as "salmon and trout migration corridors" where ODFW distribution and timing information indicates there is migration use but no rearing use in July or August or information suggests a lower mainstem river is primarily a migration corridor during the period of summer maximum temperatures,

and there is some evidence to suggest that temperatures would naturally reach 20°C/68°F.

*Lahontan Cutthroat and Redband Trout Use*

These two trout species are found in Eastern Oregon. ODFW has not updated their distribution database in this part of the State or collected life stage timing data for interior basins that do not have anadromous fish, so DEQ had to rely on other sources of information. Lahontan Cutthroat trout are limited to the Upper Quinn and Alvord Lakes basins in southeastern Oregon (USFWS 1995, Dunham 1999).

*Cool Water Species*

There are a limited number of streams or stream reaches within the anadromous basins of the State that either have no salmonid fish use during the warmest part of the summer (July or August). If ODFW information is available that shows a stream reach has no salmonid fish use (rearing or migration) during July or August, it may be designated for cool water species.

*Borax Lake Chub*

The Borax Lake Chub are located in a very limited area in the Alvord Lake Subbasin in the waters associated with Borax Lake and Lower Borax Lake in Harney County.

**Biological Criteria**

Narrative:       Numeric:       None:

The water quality standards state that waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

**Use-Specific Criteria**

Dissolved Oxygen:       Ammonia:       Other:       None:

The State of Oregon has use-specific dissolved oxygen and water temperature criteria.

Use Designation	Temperature <sup>1</sup> (Celsius)
Salmon and Trout Rearing and Migration Use	20
Salman and Steelhead Spawning Use	13
Cold Water	16
Lahontan Cutthroat Trout or Redband Trout	20
Bull Trout	12
Cool Water	----
Warm Water	----

<sup>1</sup> 7-day average maximum criteria.

Class	Concentration and Period <sup>1</sup> (All Units are mg/L)				Use/Level of Protection
	30-D	7-D	7-Mi	Min	
Salmonid Spawning		11.0 <sup>2,3</sup>		9.0 <sup>4</sup> 8.0 <sup>4</sup>	Principal use of salmonid spawning and incubation of embryos until emergence from the gravels. Low risk of impairment to cold-water aquatic life, other native fish and invertebrates.
Cold Water	8.0 <sup>5</sup>		6.5	6.0	Principally cold-water aquatic life. Salmon, trout, cold-water invertebrates, and other native cold-water species exist throughout all or most of the year. Juvenile anadromous salmonids may rear throughout the year. No measurable risk level for these communities.
Cool Water	6.5		5.0	4.0	Mixed native cool-water aquatic life, such as sculpins, smelt, and lampreys. Waterbodies includes estuaries. Salmonids and other cold-water biota may be present during part or all of the year but do not form a dominant component of the community structure. No measurable risk to cool-water species, slight risk to cold-water species present.
Warm Water	5.5			4.0	Waterbodies whose aquatic life beneficial uses are characterized by introduced, or native, warm-water species.
No Risk	No Change from Background				The only DO criterion that provides no additional risks is "no change from background". Waterbodies accorded this level of protection include marine waters and waters in Wilderness areas.
<p><b>Note:</b>  <i>Shaded</i> values present the absolute minimum criteria, unless the Department believes adequate data exists to apply the multiple criteria and associated periods.</p> <p><sup>1</sup> 30-D = 30-day mean minimum as defined in OAR 340-41-006.            7-D = 7-day mean minimum as defined in OAR 340-41-006.            7-Mi = 7-day minimum mean as defined in OAR 340-41-006.            Min = Absolute minimums for surface samples when applying the averaging period, spatial median of IGDO.</p> <p><sup>2</sup> When Intergravel DO levels are 8.0 mg/L or greater, DO levels may be as low as 9.0 mg/L, without triggering a violation.</p> <p><sup>3</sup> If conditions of barometric pressure, altitude and temperature preclude achievement of the footnoted criteria, then 95 percent saturation applies.</p> <p><sup>4</sup> Intergravel DO criterion, spatial median minimum.</p> <p><sup>5</sup> If conditions of barometric pressure, altitude, and temperature preclude achievement of 8.0 mg/L, then 90 percent saturation applies.</p>					

Information Sources

Oregon Water Quality Standards, Oregon Administrative Rules, OAR 340-041  
[http://arcweb.sos.state.or.us/rules/OARs\\_300/OAR\\_340/340\\_041.html](http://arcweb.sos.state.or.us/rules/OARs_300/OAR_340/340_041.html)

Oregon Department of Environmental Quality, Water Quality Standards Webpage  
<http://www.deq.state.or.us/wq/standards/standards.htm>