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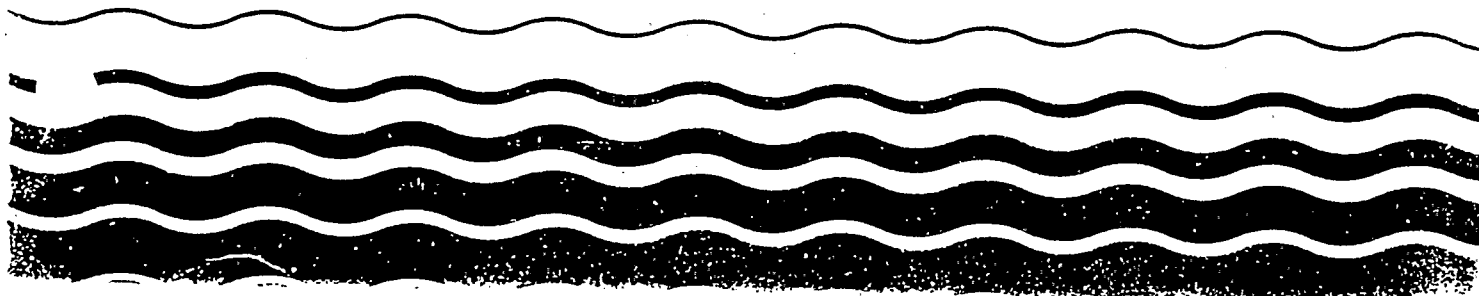


Water

Dissolved Oxygen

Reference

Water Quality Standards
Criteria Summaries:
A Compilation
of State/Federal Criteria



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The reader should consult the water quality standards of a particular State for exact regulatory language applicable to that State. Copies of State water quality standards may be obtained from the State's Water Pollution Control Agency or its equivalent.

Additional information may also be obtained from the:

Standards Branch
Criteria and Standards Division (WH-585)
Office of Water Regulations and Standards
U.S. Environmental Protection Agency
Washington, D.C. 20460
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INTRODUCTION

This digest is compiled to provide general information to the public as well as to Federal, State, and local officials. It contains excerpts from the individual Federal-State water quality standards establishing pollutant specific criteria for interstate surface waters. The water quality standards program is implemented by the U. S. Environmental Protection Agency where responsibility for providing water quality recommendations, approving State-adopted standards for interstate waters, evaluating adherence to the standards, and overseeing enforcement of standards compliance, has been mandated by Congress.

Standards, a nationwide strategy for surface water quality management, contain three major elements: the use (recreation, drinking water, fish and wildlife propagation, industrial, or agricultural) to be made of the navigable water; criteria to protect these uses; and an antidegradation statement to protect existing high quality waters, from degradation by the addition of pollutants. Guidance for the development of standards by individual States is contained in two EPA documents entitled Water Quality Standards Handbook (1983) and Quality Criteria for Water (1986).

Waters classified for the protection and propagation of fish and wildlife must contain sufficient dissolved oxygen to support aquatic life. Dissolved oxygen water quality criteria, the subject of this digest, are established so as to maintain a desirable, or good, fish population at all life-development stages. This is achieved by assuring that the dissolved oxygen concentrations do not fall below a certain minimum level which must be maintained throughout the range of varying natural conditions.

Reduced concentrations of dissolved oxygen can lead to detrimental effects such as taste and odors in waters, and limit the kinds of numbers of fish and other aquatic life present. To prevent these conditions the 1986 Quality Criteria for Water recommends the following aerobic conditions in the water column and, except as affected by natural phenomena, at the sediment-water interface.

<u>Coldwater Criteria</u>			<u>Warmwater Criteria</u>		
Early Life Stages ^{1,2}		Other Life Stages	Early Life Stages ²		Other Life Stages
30 Day Mean	NA ³	6.5		NA	5.5
7 Day Mean	9.5 (6.5)	NA		6.0	NA
7 Day Mean minimum	NA	5.0		NA	4.0
1 Day Mean ^{4,5} minimum	8.0 (5.0)	4.0		5.0	3.0

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- 1 These are water column concentrations recommended to achieve the required intergravel dissolved oxygen concentrations shown in parentheses. the 3 mg/L differential is discussed in the criteria document. For species that have early life stages exposed directly to the water column, the figures in parentheses apply.
 - 2 Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching.
 - 3 NA (not applicable).
 - 4 For highly manipulatable discharges, further restrictions apply (see page 37)
 - 5 All minima should be considered as instantaneous concentrations to be achieved at all times.
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Since water quality standards are revised from time to time, following procedures set forth in the Clean Water Act, individual entries in this digest may be superseded. This digest will be updated periodically. Because this publication is intended for use only as a general information reference, the reader needs to refer to the current approved water quality standards to obtain the latest information for special purposes and applications. These can be obtained from the State water pollution control agencies or the EPA Regional Offices.

REFERENCES

- 5 California Water Quality Standards by River Basins, ca. 1975.
- 9 Florida Administrative Code, Chapter 17-4, 1987 and Florida Administrative Code, Chapter 17-3, 1988.
- 13 Illinois Pollution Control Board, Board Order R87-27, 1988
- 19 Maine Water Classification Program, Maine Revised Statutes Annotated, Title 38, Article 4-A, State of Maine Department of Environmental Protection, May 1987.
- 27 Nebraska Water Quality Standards, Title 117, Chapter 1, Nebraska Department of Environmental Control.
- 31 Water Quality Standards for Interstate and Intrastate Streams in New Mexico, State of New Mexico Water Quality Control Commission, 1988.
- 35 Ohio Water Quality Standards, Chapter 3745-1 of the Administrative Code, Ohio Environmental Protection Agency, 1985.
- 42 Tennessee's Water Quality Criteria and Stream Use Classifications for Interstate and Intrastate Streams, Tennessee Water Quality Control Board: Department of Health and Environment, 1987.
- 43 Texas Surface Water Quality Standards, Texas Water Commission, Rule Change, 1988.
- 44 Utah Standards of Quality for Waters of the State, Wastewater Disposal Regulations: Part II, State of Utah Department of Health: Division of Environmental Health, 1988.
- 45 Vermont Water Quality Standards, State of Vermont Water Resource Board, 1987.
- 48 Water Quality Standards, West Virginia Legislative Rules, State Water Resources Board, 1985.
- 51 Water Quality Standards for American Samoa, 1984, pp. 20, 24-25.
- 52 Department of Consumer and Regulatory Affairs, Chapter 42-Water Quality Standards of the District of Columbia, Section 4206.1.
- 53 Revised Guam Water Quality Standards, Guam Environmental Protection Agency, 1984, p. 9.
- 54 Commonwealth of Northern Mariana Islands Marine and Fresh Water Quality Standards, Commonwealth Register, Vol. 8 No. 5, 1986, p. 4465.
- 56 Trust Territories, Title 63, Chapter 13, Subchapter VII, Marine and Fresh Water Quality Standard Regulations, 1986, pp. 6-7.

- 57 Water Quality Standards for Coastal Waters of the Virgin Islands, Title 12, Chapter 7. Subchapter 186, 1985, pp. 263-265.

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- 1 Pages 701:1003-1010, September 5, 1980
- 2 Page 706:1003, November 7, 1986
- 3 Page 711:1018, February 7, 1986
- 4 Pages 716:1004-1005, August 30, 1985
- 6 Page 726:1009, August 22, 1986
- 7 Pages 731:1004-1008, May 14, 1986
- 8 Pages 736:1007-1010, March 28, 1986
- 9 Pages 746:1010.2-1014, September 5, 1986
- 11 Pages 756:1003-1008, September 20, 1985
- 12 Pages 761:1026-1027, January 23, 1987
- 14 Pages 771:1003-1004, August 10, 1984
- 15 Page 776:1005, February 13, 1987
- 16 Page 781:1011, March 27, 1987
- 17 Pages 786-1008-1009, November 29, 1985
- 18 Page 791:1007, January 18, 1985
- 20 Pages 801:1002-1003, April 19, 1985
- 21 Pages 806:1002-1003, June 21, 1985
- 22 Pages 811:1004-1006, February 13, 1987
- 23 Pages 816:1006-1008, June 25, 1982
- 24 Pages 821:1002-1004, October 25, 1985
- 25 Pages 826:1009-1010, June 21, 1985
- 26 Pages 831:1004-1009, April 19, 1985
- 28 Pages 841:1001-1011, February 22, 1985
- 29 Page 846:1004, October 5, 1984

- 30 Page 851:1012, April 11, 1986
- 32 Pages 861:1008-1012, November 29, 1985
- 33 Page 866:1009, August 29, 1986
- 34 Pages 871:1003-1004, June 7, 1985
- 36 Page 881:1004, September 26, 1986
- 37 Page 886:1005, May 9, 1986
- 38 Page 891:1006, August 9, 1985
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- 40 Pages 906:1006-1009, November 29, 1985
- 41 Pages 911:1005-1006, March 22, 1985
- 46 Page 936:1002, February 28, 1986
- 47 Pages 941:1003-1005, October 21, 1983
- 49 Page 951:1002, December 19, 1986
- 50 Page 956:1005, July 5, 1985
- 55 Pages 896:1003-1004, December 23, 1983

State

Designated Use and Criteria Value

Alabama¹

Public Water Supply, Swimming and Other Whole Body Water-Contact Sports, Shellfish Harvesting, and Fish and Wildlife. For a diversified warm water biota, including game fish, daily dissolved oxygen concentrations shall not be less than 5 mg/l at all times; except under extreme conditions due to natural causes, it may range between 5 mg/l and 4 mg/l, provided that the water quality is favorable in all other parameters. The normal seasonal and daily fluctuations shall be maintained above these levels. In no event shall the DO level be less than 4 mg/l due to discharges from existing impoundments. All new impoundments shall be designed so that the discharge will contain at least 5 mg/l DO where practicable and technologically possible. The EPA, in cooperation with the State of Alabama and parties responsible for impoundments, shall develop a program to improve the design of existing facilities.

In coastal waters surface DO concentrations shall not be less than 5 mg/l, except where natural phenomena cause the value to be depressed.

In estuaries and tidal tributaries, DO concentrations shall not be less than 5 mg/l, except in dystrophic waters or where natural conditions cause the value to be depressed.

In the application of DO criteria referred to above, DO shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, DO criteria will be applied at mid-depth.

Agricultural and Industrial Water Supply, Industrial Operations. Sewage, industrial wastes, or other wastes shall not cause the DO to be less than 3.0 ppm. In the application of DO criteria referred to above, DO concentration shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, DO criteria will be applied at mid-depth.

Navigation. Sewage, industrial wastes, or other wastes shall not cause the DO to be less than 2.0 ppm. In the application of DO criteria referred to above, DO concentration shall be measured at a depth of 5 feet in waters 10 feet or greater in depth; and for those waters less than 10 feet in depth, DO criteria will be applied at mid-depth.

State

Alaska²

Designated Use and Criteria Value

Water Supply for Drinking, Culinary and Food Processing, and Water Recreation. Shall be greater than or equal to 4 mg/l. (this does not apply to lakes or reservoirs in which supplies are taken from below the thermocline or to groundwaters)

Water Supply for Agriculture, Including Irrigation, and Stock Watering. Shall be greater than 3 mg/l in surface waters.

Aquaculture. Shall be greater than 7 mg/l in surface waters. The concentration of total dissolved gas shall not exceed 110% of saturation at any point of sample collection.

Growth and Propagation of Fish, Shellfish, and Other Aquatic Life, and Wildlife Including Waterfowl and Furbearers. Shall be greater than 7 mg/l in waters used by anadromous fish and resident fish. In no case shall DO be less than 5 mg/l to a depth of 20 cm in the interstitial waters of gravel utilized by anadromous or resident fish for spawning. For waters not used by anadromous or resident fish, DO shall be greater than or equal to 5 mg/l. In no case shall DO above 17 mg/l be permitted. The concentration of total dissolved gas shall not exceed 110% of saturation at any point of sample collection.

Industrial Water Supply. Shall not cause detrimental effects on established water supply treatment levels.

Arizona³

No person shall lower the dissolved oxygen concentration to less than:

Drinking Water Supply -- Not specified.

Full Body Contact/Incidental Human Contact -- 6.0 mg/l.

Aquatic and Wildlife -- 6.0 mg/l.

Coldwater Fishery -- 6.0 mg/l.

Arkansas⁴

Trout or Coolwater Fisheries. 6.0 mg/l or greater.

Warmwater Fisheries. 5.0 mg/l or greater.

The above standards apply, except where lower values occur as a result of natural factors. When the water temperature exceeds 22°C, the DO concentration may be lowered 1 mg/l below the applicable standard due to diurnal fluctuation. This decrease shall not persist longer than 8 hours during any 24-hour period.

State

Designated Use and Criteria Value

California⁵

(1) Klamath River Basin, North Coastal Basin.

Dissolved oxygen concentrations shall not be reduced below the following minimum levels at any time:

Waters designated WARM, MAR, or SAL 5.0 mg/l

Waters designated COLD 6.0 mg/l

Waters designated SPWN..... 7.0 mg/l

Waters designated SPWN during critical spawning and egg incubation periods..... 9.0 mg/l

(2) San Francisco Bay Basin

For all tidal waters, the following minimums shall apply:

In the Bay downstream of Carquinez Bridge 5.0 mg/l
Upstream from Carquinez Bridge 7.0 mg/l

For nontidal waters, the following minimums shall apply:

Waters designated as cold water habitat 7.0 mg/l

Waters designated as warm water habitat 5.0 mg/l

(3) Central Coastal Basin

Objectives for inland surface waters, enclosed bays and estuaries.

The dissolved oxygen concentration shall not be reduced below the following minimum values at any time:

Water designated AGR, excluding GWR 2.0 mg/l

WARM 5.0 mg/l

SPWN, MAR, or COLD 7.0 mg/l

(4a) Santa Clara River Basin

The mean annual dissolved oxygen concentration shall be greater than 7 parts per million (ppm), provided that no single determination shall be less than 5.0 ppm, except when natural conditions cause lesser concentrations. Additionally, for cold surface streams and cold water spawning streams the dissolved oxygen content shall not fall below 6.0 and 7.0 mg/l, respectively, as the result of waste discharges.

(4b) Los Angeles River Basin

Objectives for inland surface waters, enclosed bays and estuaries.

Dissolved oxygen shall not fall below 5.0 mg/l at any time as the result of waste discharges; when natural factors cause lesser concentrations, then controllable water quality factors shall not cause further reduction.

For that area known as the outer harbor area of the Los Angeles-Long Beach Harbors, the mean annual dissolved oxygen concentrations shall be 6.0 mg/l or greater, provided that no single determination shall be less than 5.0 mg/l. When natural conditions cause lesser concentrations, then controllable water quality factors shall not cause further reduction.

Additionally, for cold surface streams and cold water spawning streams the dissolved oxygen content shall not fall below 6.0 and 7.0 mg/l, respectively.

(5a,b,c) Sacramento-San Joaquin Delta

This includes water quality objectives that apply to all inland surface waters (excluding the Delta) of the basins, and objectives that apply only to specific surface water bodies.

The monthly median of the mean daily dissolved oxygen concentration shall not fall below 85 percent of the saturation in the main water mass and the 95 percentile concentration shall not fall below 75 percent of saturation. The dissolved oxygen concentrations shall not be reduced below the following minimum levels at any time:

- Waters designated WARM 5.0 mg/l
- Waters designated COLD 7.0 mg/l
- Waters designated SPWN 7.0 mg/l

The following objectives apply to the water bodies specified. To the extent of any conflict with the above, the more stringent objective applies. The dissolved oxygen concentrations:

Sacramento River, Shasta Dam to Eye Street Bridge. Shall be maintained at or near established seasonal levels from Keswick Dam to Eye Dam to Eye Street Bridge Street Bridge.

State

Designated Use and Criteria Value

Sacramento River, Shasta Dam to Colusa Basin Drain. Shall be greater than or equal to 9.0 mg/l from Keswick Dam to Hamilton City from 1 June to 31 August. When natural conditions lower the dissolved oxygen below this level, the concentration shall be maintained at or above 95 percent of the saturation.

Sacramento River, Shasta Dam to Eye Street Bridge. Shall be greater than or equal to 7.0 mg/l from Hamilton City to Eye Street Bridge Dam to Eye Street Bridge from 1 June to 31 August.

Lake Natoma. Shall be greater than or equal to 7.0 mg/l all year.

Feather River, Fish Barrier Dam to Sacramento River. Shall be greater than or equal to 8.0 mg/l from Oroville Fish Barrier to Honcut Creek from 1 September to 31 May.

Merced River, Source to McClure Lake. Shall be greater than or equal to 8.0 mg/l from Cressey to New Exchequer Dam at all times.

Tuolumne River, Don Pedro Dam to San Joaquin River. Shall be greater than or equal to 8.0 mg/l from Waterford to La Grange from 15 October to 15 June.

The following specific numeric objectives apply to the waters of the Sacramento-San Joaquin Delta. All waters lying within the legal boundaries of the Delta are covered by these objectives unless otherwise specified.

The following objectives apply to indicated Delta waters: The dissolved oxygen concentration shall not be reduced below the following levels:

- 7.0 mg/l in the Sacramento River and in all Delta waters west of the Antioch Bridge.

- 5.0 mg/l in all other Delta waters with the following exception: In certain bodies of water which are constructed for special purposes and from which fish have been excluded on the fishery is not important as a beneficial use.

(5D) Tulare Lake Basin

The dissolved oxygen content in all surface waters of the Basin, as a result of controllable water quality factors, shall not be reduced, at any time, below the following minimum concentrations:

State**Designated Use and Criteria Value**

Waters designated WARM 5.0 mg/l

Waters designated COLD or SPWN 7.0 mg/l

Waste discharges shall not cause median dissolved oxygen concentrations in the main water mass (at centroid of flow) of streams and above the thermocline in lakes to fall below 85 percent of saturation concentration, and the 95 percentile concentration to fall below 75 percent of saturation concentration.

Additionally, dissolved oxygen at any location shall not fall below 5 mg/l or the minimum value shown in Table 4-2, whichever is greater.

(6A) North Lahontan Basin

The dissolved oxygen concentration, in terms of percent saturation, shall not be depressed by more than 10 percent, nor shall the minimum dissolved oxygen concentration at any time be less than the following limits, whichever is more restrictive.

Waters designated WARM 5.0 mg/l

Waters designated COLD 7.0 mg/l

(6B) South Lahontan Basin

The dissolved oxygen concentrations, in terms of percent saturation, shall not be depressed by more than 10 percent, nor shall the minimum dissolved oxygen concentration at any time be less than 80 percent of saturation of less than the following limits, whichever is more restrictive:

Waters designated WARM 5.0 mg/l

Waters designated COLD 7.0 mg/l

(7A) West Colorado River Basin

As a result of controllable water quality factors, the dissolved oxygen concentration shall not be reduced below the following minimum levels at any time:

Waters designated WARM or SAL 5.0 mg/l

Waters designated COLD 7.0 mg/l

When natural factors cause lesser concentrations, controllable water quality factors shall not cause further reduction.

State

Designated Use and Criteria Value

(7B) East Colorado River Basin

As a result of controllable water quality factors, the dissolved oxygen concentration shall not be reduced below the following minimum levels at any time:

Colorado River (entire reach) 6.0 mg/l

Other waters designated WARM 5.0 mg/l

Other waters designated COLD 7.0 mg/l

Where natural factors cause lesser concentrations, controllable water quality factors shall not cause further reduction.

(8) Santa Ana River River Basin

(1) Within Bay water in general, tidal prisms of San Gabriel River, and flood control channels:

As a result of waste discharges, the mean annual dissolved oxygen concentration shall not be less than 5.0 mg/l nor shall the minimum dissolved oxygen concentration be below 5.0 mg/l at any time.

(2) Within dead-end channels in Newport Bay (channels west of Newport Boulevard and channel west of Lido Peninsula), tidal prism of Santa Ana River, and Newport Shores Marina:

The dissolved oxygen concentration shall be greater than 4 mg/l provided that not more than 20% of the samples collected at any station during any quarter shall be less than 4 mg/l and provided further that no single sample shall be less than 3 mg/l.

(3) Inland surface water (including rivers, streams, lakes and reservoirs):

The median dissolved oxygen concentration shall not fall below 85% of saturation in main water mass and the 95 percentile concentration shall not fall below 75% of saturation; dissolved oxygen at any location shall not fall below 5 mg/l for waters designated WARM or 6 mg/l for waters designated COLD.

(9) San Diego Basin

Dissolved oxygen levels shall not be less than 5.0 mg/l in inland surface waters with designated MAR or WARM beneficial uses or less than 6.0 mg/l in waters with designated COLD beneficial uses. The annual mean

State

Designated Use and Criteria Value

dissolved oxygen concentration shall not be less than 7 mg/l more than 10% of the time.

Estuarine waters - a min. of 5 mg/l for most waters, minimum of 6 and 7 mg/l for other waters.

Coastal waters - a min. of 5 mg/l with additional limits on the annual mean average which ranges from 6 to 7 mg/l.

Colorado⁶

Recreational Classes 1 and 2, and Agriculture.
3.0 mg/l

Drinking Water Supply. 3.0 mg/l. Aerobic⁽²⁾

Aquatic Life Class 1, Cold Water Biota. 6.0 mg/l⁽²⁾,
7.0 mg/l (spawning)

Aquatic Life Class 1, Warm Water Biota. 5.0 mg/l

Aquatic Life Class 2. Established on a case-by-case basis.

(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/l 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.

Connecticut⁷

Inland Waters:

Classes AA, A, B. Not less than 5.0 mg/l at any time.

Class C. Not less than 4.0 mg/l at any time.

Coastal and Marine Waters:

Class SA. Not less than 6.0 mg/l at any time.

Class SB. Not less than 5.0 mg/l at any time.

Class SC. Not less than 4.0 mg/l at any time.

State

Delaware⁸

Designated Use and Criteria Value

General criteria for freshwater streams. Average DO shall be 5.5 mg/l with minimum of 4.0 mg/l.*

Cold Water Fisheries. Average DO shall be 6.5 mg/l with a minimum of 4.0 mg/l.

General criteria for saltwater streams. Average DO shall be 5.0 mg/l with minimum of 4.0 mg/l.*

Delaware River (PA-DE line, RM 78.8 to Liston Point, RM 48.2). During 4/1 - 6/1, and 9/16 - 12/31, seasonal average concentration shall not be less than 6.5 mg/l in the entire zone. At no time shall the daily average concentration be less than 3.5 mg/l at RM 78.8, 4.5 mg/l at RM 70.0, and 6.0 mg/l at RM 59.5.

Leves-Rehoboth Canal. Shall not be less than an average value of 3.0 mg/l, nor go below a minimum of 2.0 mg/l at any time.

Waters of Exceptional Recreational or Ecological Significance (ERES Waters). In cases where natural conditions preclude attainment of dissolved oxygen criteria, reduction in dissolved oxygen levels as a result of human activities shall be prohibited.

* In cases where natural conditions preclude attainment of these criteria, allowable reduction in DO levels as a result of human activities shall be determined through application of the requirements of Section 2 of these Standards.

Florida⁹

Class I, Potable Water Supply. Shall not be less than 5 mg/l. *

Class II, Shellfish Propagation or Harvesting. The concentration in all waters shall not average less than 5 mg/l in a 24-hour period and shall never be less than 4 mg/l. *

Class III, Recreation, Fish and Wildlife. In predominantly fresh waters, the concentration shall not be less than 5 mg/l. In predominantly marine waters, the concentration shall not average less than 5 mg/l in a 24-hour period and never less than 4 mg/l.*

Class IV, Agricultural Supplies. Shall not average less than 4.0 mg/l in a 24-hour period and shall never be depressed below 3.0 mg/l.

Class V, Navigation, Utility and Industrial Use. Shall not be less than 0.3 mg/L 50 % of the time on an annual basis for flows ~~>~~250 cfs and shall never be

<u>State</u>	<u>Designated Use and Criteria Value</u>
	less than 0.1 mg/L.*
	* Normal daily and seasonal fluctuations above this level shall be maintained.
Georgia ¹⁰	<p>Drinking Water Supplies, Recreation, Fishing: Trout streams. Daily average of 6.0 mg/l and no less than 5.0 mg/l at all times.</p> <p>Warm water fisheries. Daily average of 5.0 mg/l and no less than 4.0 mg/l at all times.</p> <p>Agricultural, Industrial, Navigational, and Urban Stream Uses. No less than 3.0 mg/l at any time.</p>
Hawaii ¹¹	<p>Streams. Not less than 80% saturation.</p> <p>Estuaries: All except Pearl Harbor. Not less than 75% saturation. Pearl Harbor. Not less than 60% saturation.</p> <p>Embayments, Open Coastal and Oceanic Waters. Not less than 75% saturation.</p>
Idaho ¹²	<p>Warm Water Biota. DO concentrations exceeding 5 mg/l at all times. *</p> <p>Cold Water Biota. DO concentrations exceeding 6 mg/l at all times. *</p> <p>Salmonid Spawning. DO concentrations exceeding 6 mg/l or 90% of saturation, whichever is greater.</p> <p>* In lakes and reservoirs this standard does not apply to (i) the bottom 20% of water depth in natural lakes and reservoirs where depths are 35 meters or less. (ii) the bottom 7 meters of water depth in natural lakes and reservoirs where depths are greater than 35 meters. (iii) those waters of the hypolimnion in stratified lakes and reservoirs.</p>
Illinois ¹³	<p>General Use. DO (STORET number 00300) shall not be less than 6.0 mg/l during at least 16 hours of any 24 hour period, nor less than 5.0 mg/l at any time.</p> <p>Secondary Contact and Indigenous Aquatic Life. DO (STORET number 00300) shall not be less than 4.0 mg/l at any time except that the Calumet-sag channel shall not be less than 3.0 mg/L at any time.</p>

State

Designated Use and Criteria Value

Lake Michigan. DO (STORET number 00300) shall not be less than 90% of saturation except due to natural causes.

Indiana¹⁴

Warm Water Fish. Shall average at least 5.0 mg/l per calendar day and shall not be less than 4.0 mg/l at any time.

Cold Water Fish.

(a) In those waters designated by the Indiana Department of Natural Resources for put-and-take trout fishing, DO concentration shall not be less than 6.0 mg/l at any time or place.

(b) Spawning Areas (during the spawning season) shall be protected during the spawning by a minimum DO concentration of 7.0 mg/l.

Iowa¹⁵

Class B.

(1) DO shall not be less than 5.0 mg/l during at least 16 hours of any 24-hour period and not less than 4.0 mg/l at any time during the 24-hour period.

(2) Cold Water Fisheries. DO shall not be less than 7.0 mg/l during at least 16 hours of any 24-hour period and not less than 5.0 mg/l at any time during the 24-hour period.

Kansas¹⁶

Aquatic Life Use. DO shall not be lowered below 5.0 mg/l by the influence of artificial sources.

Kentucky¹⁷

Warmwater Aquatic Habitat.

(1) DO shall be maintained at a minimum concentration of 5 mg/l daily average and at no time should the instantaneous minimum be less than 4 mg/l.

(2) The DO concentration shall be measured at mid-depth in waters having a total depth of 10 feet or less and at representative depths in other waters.

Coldwater Aquatic Habitat.

(1) A minimum concentration of 6 mg/l as a daily average and 5 mg/l as an instantaneous minimum shall be maintained at all times.

(2) In impoundments which support trout, the concentration of dissolved oxygen in waters below the epilimnion shall be kept consistent with natural water quality.

State

Designated Use and Criteria Value

Louisiana¹⁸

The following dissolved oxygen (DO) values represent minimum values for the type of water specified. For short periods of time in freshwater, a nocturnal (nightly) variation below the standard specified may occur. This accommodates the natural reduction in photosynthetic activity and oxygen production by plants that occurs during hours of darkness. However, no waste discharge or activity of man shall lower the dissolved oxygen concentration to the point where the variation falls below the specified minimum.

Fresh Water. For a diversified population of warmwater biota including sport fish, the daily (daytime) DO concentration shall be at/or above 5 mg/l assuming normal seasonal and daily variations are above this concentration. Individual measurements may range between 5 and 4 mg/l for short nocturnal (nighttime) periods, not to exceed eight hours. These values shall apply except where the Office determines that dystrophic waters exist or where otherwise provided for in these standards.

Estuaries and Tidal Tributaries. DO concentrations shall not be less than 4 mg/l at any time except where natural conditions cause levels to be lower or where otherwise provided for in these standards.

Coastal Marine Waters (Nearshore Gulf of Mexico). DO concentrations in surface coastal waters shall not be less than 5 mg/l except when upwellings and other natural phenomena cause this value to be lower.

For criteria specific segments, see BNA Environment Reporter pages 791:1021 - 1056.

Maine¹⁹

Class AA, SA. The DO content shall be as naturally occurs.

Class A. The DO content shall be not less than 7 parts per million (mg/l) or 75% of saturation, whichever is higher.

Class B. The DO content shall be not less than 7 parts per million or 75% of saturation, whichever is higher, except that for the period from October 1st to May 14th, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean DO concentration shall not be less than 9.5 ppm and the 1-day minimum shall not be less than 8.0 ppm in identified fish spawning areas.

State

Designated Use and Criteria Value

Class C. The DO content shall be not less than 5 ppm or 60% of saturation, whichever is higher, except that in identified salmonid spawning areas where water quality is sufficient to ensure spawning, egg incubation and survival of early life stages, that water quality sufficient for these purposes shall be maintained.

Class SB. The DO content shall be not less than 85% of saturation.

Class SC. The DO content shall be not less than 70% of saturation.

Maryland²⁰

Classes I, II, IV. The dissolved oxygen concentration may not be less than 5.0 mg/l at any time.

Class III. The dissolved oxygen concentration may not be less than 5.0 mg/l at any time, with a minimum daily average of not less than 6.0 mg/l.

Massachusetts²¹

Classes A, B, C. Shall be a minimum of 5.0 mg/l in warm water fisheries and a minimum of 6.0 mg/l in cold water fisheries.

Class SA, SB, SC. Shall be a minimum of 85 percent of saturation at water temperatures above 77°F (25°C) and shall be a minimum of 6.0 mg/l at water temperatures of 77°F (25°C) and below.

Michigan²²

R 323.1064. Great Lakes, connecting waters, and inland streams. Rule 64.

(1) A minimum of 7 mg/l of dissolved oxygen (DO) in all Great Lakes and connecting waterways shall be maintained, and, except for inland lakes as prescribed in R 323.1065, a minimum of 7 mg/l of DO shall be maintained at all times in all inland waters designated by these rules to be protected for coldwater fish. In all other waters, except for inland lakes as prescribed by R 323.1065, a minimum of 5 mg/l of DO shall be maintained. These standards do not apply for a limited warmwater fishery use subcategory established pursuant to R 323.1100(10) or during those periods when the standards specified in subrule (2) of this rule apply.

(2) Waters of the state which do not meet the standards set forth in subrule (1) of this rule shall be upgraded to meet those standards. For existing point source discharges to these waters, the commission may issue permits pursuant to R 323.2145

State

Designated Use and Criteria Value

which establish schedules to achieve the standards set forth in subrule (1) of this rule. If existing point source dischargers demonstrate to the commission that the dissolved oxygen standards specified in subrule (1) of this rule are not attainable through further feasible and prudent reductions in their discharges or that the diurnal variation between the daily averages and daily minimum DO concentrations in those waters exceeds 1 mg/l, further reductions in oxygen-consuming substances from such discharges will not be required, except as necessary to meet the interim standards specified in this subrule, until comprehensive plans to upgrade these waters to the standards specified in subrule (1) of this rule have been approved by the commission and orders, permits, or other actions necessary to implement the approved plans have been issued by the commission. In the interim, all of the following standards apply:

(a) For waters of the state designated for use for coldwater fish, except for inland lakes, the dissolved oxygen shall not be lowered below a minimum of 6 mg/l at the design flow during the warm weather season in accordance with R 323.1090(3) and (4). At the design flows during other seasonal periods, as provided in R 323.1090(4), a minimum of 7 mg/l shall be maintained. At flows greater than the design flows, DO shall be higher than the respective minimum values specified in this subdivision.

(b) For waters of the state designated for use for warmwater fish and other aquatic life, except for inland lakes as prescribed in R 323.1065, the DO shall not be lowered below a minimum of 4 mg/l, or below 5 mg/l as a daily average, at the design flow during the warm weather season in accordance with R 323.1090(3) and (4). At the design flows during other seasonal periods as provided in R 323.1090(4), a minimum of 5 mg/l shall be maintained. At flows greater than the design flows, DO shall be higher than the respective minimum values specified in this subdivision.

(c) For waters of the state designated for use for warmwater fish and other aquatic life, but also designated as principal migratory routes for anadromous salmonids, except for inland lakes as prescribed in R 323.1065, the DO shall not be lowered below 5 mg/l as a minimum during periods of migration.

R 323.1065. Dissolved oxygen; inland lakes. Rule 65.

(1) The following standards for dissolved oxygen shall apply to lakes designated as trout lakes by the natural resources commission or lakes listed in the publication entitled "Coldwater Lakes of Michigan":

State

Designated Use and Criteria Value

(a) In stratified coldwater lakes which have DO concentrations less than 7 mg/l in the upper half of the hypolimnion, a minimum of 7 mg/l DO shall be maintained throughout the epilimnion and upper 1/3 of the thermocline during stratification.*

(b) Except for lakes described in subdivision (c) of this subrule, in stratified coldwater lakes which have DO concentrations greater than 7 mg/l in the upper half of the hypolimnion, a minimum of 7 mg/l of DO shall be maintained in the epilimnion, thermocline, and upper half of the hypolimnion.*

(c) In stratified coldwater lakes which have DO concentrations greater than 7 mg/l throughout the hypolimnion, a minimum of 7 mg/l shall be maintained throughout the lake.

(d) In unstratified coldwater lakes, a minimum of 7 mg/l of DO shall be maintained throughout the lake.

(2) For all other inland lakes not specified in subrule (1) of this rule, during stratification, a minimum DO concentration of 5 mg/l shall be maintained throughout the epilimnion. At all other times, DO concentrations greater than 5 mg/l shall be maintained.

* Lakes capable of sustaining oxygen throughout the hypolimnion shall maintain oxygen throughout the hypolimnion. At all other times, DO concentrations greater than 7 mg/l shall be maintained.

Minnesota²³

Fisheries and Recreation.

Class 2A. Not less than 7 mg/l* at all times (instantaneous minimum concentration).

Class 2B. Not less than 5 mg/l* at all times (instantaneous minimum concentration).

Class 2C. Not less than 5 mg/l* at all times (instantaneous minimum concentration).

* This dissolved oxygen standard shall be construed to require compliance with the standard 50 percent of the days at which the flow of the receiving water is equal to the lowest flow with a once in ten year recurrence interval (7Q10).

Mississippi²⁴

All Classes. Dissolved oxygen concentrations shall be maintained at a daily average of not less than 5.0 mg/l with an instantaneous minimum of not less than

State

Designated Use and Criteria Value

4.0 mg/l in streams; shall be maintained at a daily average of not less than 5.0 mg/l with an instantaneous minimum of not less than 4.0 mg/l in estuaries and in the tidally affected portions of streams; and shall be maintained at a daily average of not less than 5.0 mg/l with an instantaneous minimum of not less than 4.0 mg/l in the epilimnion (i.e. the surface layer of lakes and impoundments that are thermally stratified, or five feet from the water's surface (mid-depth if the lake or impoundment is less than 10 feet deep at the point of sampling)) for lakes and impoundments that are not stratified.

Epilimnion samples may be collected at the approximate mid-point of that zone (i.e., the mid-point of the distance or if the epilimnion is more than five feet in depth, then at five feet from the water's surface).

Ephemeral Streams. The dissolved oxygen shall be maintained at an appropriate level to avoid nuisance conditions.

Missouri²⁵

Water contaminants shall not cause the dissolved oxygen to be lower than the levels described below:

Protection of Aquatic Life. 5 mg/l.

Coldwater Fishery. 6 mg/l.

Montana²⁶

A-1, B-1, C-1 Classification. Not below 7.0 mg/l.

B-2, C-2 Classification. Not below 7.0 mg/l from 10/1-6/1, nor below 6.0 mg/l from 6/2-9/30.

B-3, C-3 Classification. Not below 5.0 mg/l.

E Classification. Not below 3.0 mg/l.

Nebraska²⁷

Coldwater Habitat:

Class A.

One day minimum of not less than 8 mg/L for salmonid early life stages. This criterion applies from October 1 through May 31.

One day minimum of not less than 4.0 mg/L for all life stages other than salmonid early life stages. This criterion applies from June 1 through September 30.

Seven day mean minimum of not less than 5.0 mg/L. This criterion applies from June 1 through September 30.

State

Designated Use and Criteria Value

Seven day mean of not less than 9.5 mg/L for salmonid early life stages. This criterion applies from October 1 through May 31.

Thirty day mean of not less than 6.5 mg/L. This criterion applies from June 1 through September 30.

Class B.

One day minimum of not less than 5 mg/L for coldwater fish early life stages. This criterion applies from April 1 through June 30.

One day minimum of not less than 4.0 mg/L for all life stages other than coldwater fish early life stages. This criterion applies from July 1 through March 31.

Seven day mean minimum of not less than 5.0 mg/L. This criterion applies from July 1 through March 31.

Seven day mean of not less than 6.5 mg/L for coldwater fish early life stages. This criterion applies from April 1 through June 30.

Thirty day mean of not less than 6.5 mg/L. This criterion applies from July 1 through March 31

Un-ionized Ammonia (as N) is not to exceed 0.04 mg/L.

Warmwater Habitat:

Class A.

One day minimum of not less than 5.0 mg/L for early life stages of identified key species. This criterion applies from April 1 through September 30.

One day minimum of not less than 3.0 mg/L for all life stages other than early life stages of identified key species. This criterion applies from October 1 through March 31.

Seven day mean minimum of not less than 4.0 mg/L. This criterion applies from October 1 through March 31.

Seven day mean of not less than 6.0 mg/L for early life stages of identified key species. This criterion applies from April 1 through September 30.

Thirty day mean of not less than 5.5 mg/L. This criterion applies from October 1 through March 31.

Un-ionized Ammonia (as N) is not to exceed 0.06 mg/L.

State

Designated Use and Criteria Value

Class B.

One day minimum of not less than 3.0 mg/L.

Seven day mean minimum of not less than 4.0 mg/L.

Thirty day mean of not less than 5.5 mg/L.

Un-ionized Ammonia (as N) is not to exceed 0.10 mg/L.

Nevada²⁸

Class A. Must not be less than 6.0 mg/l.

Class B and C. For trout waters, not less than 6.0 mg/l; for non-trout waters, not less than 5.0 mg/l.

Class D. Not less than 3.0 mg/l.

For DO concentrations of specific regions, see

New Hampshire²⁹

Class A. ¹ Not less than 75% of saturation, nor less than 6 ppm¹ in cold water fisheries.

Class B. ¹ Not less than 75% of saturation, nor less than 6 ppm¹ in cold water fisheries unless naturally occurring.

Class C. Not less than 5 ppm¹ in warm water fisheries, nor less than 6 ppm¹ in cold water fisheries unless naturally occurring.

1. ppm = parts per million = mg/l.

New Jersey³⁰

(i) FW2-TP. Not less than 7.0 mg/l at any time.

(ii) FW2-TM. 24 hour average not less than 6.0 mg/l. Not less than 5.0 mg/l at any time. (see paragraph viii below)

(iii) FW2-NT. 24 hour average not less than 5.0 mg/l, but not less than 4.0 mg/l at anytime. (see paragraph viii below)

(iv) Tidal portions of FW2-NT tributaries to the Delaware River, between Rancocas Creek and Big Timber Creek inclusive. Not less than 4.0 mg/l at any time.

(v) SC. Not less than 5.0 mg/l at any time.

(vi) SE2. Not less than 4.0 mg/l at any time.

(vii) SE3. Not less than 3.0 mg/l at any time.

State

Designated Use and Criteria Value

(viii) FW2-TM, FW2-NT, SE1. Supersaturated dissolved oxygen values shall be expressed as their corresponding 100 percent saturation values for purposes of calculating 24 hour averages.

New Mexico³¹

Coldwater Fishery	6.0 mg/L
Limited Warmwater Fishery	4.0 mg/L
Marginal Coldwater Fishery	5.0 mg/L
Warmwater Fishery	5.0 mg/L

New York³²

Classes AA, A, B, C:

Cold water trout spawning waters. Not less than 7.0 mg/l from other than natural conditions.

Trout waters. Minimum daily average shall not be less than 6.0 mg/l. At no time shall DO concentration be less than 5.0 mg/l.

Nontrout waters. Minimum daily average not less than 5.0 mg/l. At no time shall DO concentration be less than 4.0 mg/l.

Class D. Shall not be less than 3 mg/l at any time.

Class SA, SB, SC. Shall not be less than 5 mg/l at any time.

Class SD. Shall not be less than 3 mg/l at any time.

Class A Special. (Great Lakes epilimnion) Not less than 6.0 mg/l.

Class AA Special:

Class I. Shall not be less than 4 mg/l at any time.

Class II. Average not less than 30 percent saturation during any week of the year, provided such saturation levels insure adequate oxygen to support fish and shellfish life at all times.

North Carolina³³

Trout waters. Not less than 6 mg/l.

Non-trout waters. Not less than a daily average of 5 mg/l with a minimum instantaneous value of not less than 4 mg/l.

Swamp waters. May have lower values if caused by natural conditions.

State

Designated Use and Criteria Value

North Dakota³⁴

All streams. Not less than 5.0 mg/l.

Ohio³⁵

Warmwater Aquatic Life Habitat. 4.0 mg/l minimum at any time, 5.0 mg/l minimum 24-hour average.

Exceptional Warmwater, and Coldwater Aquatic Life Habitat. 6.0 mg/l minimum at any time.

Nuisance Prevention. 2.0 mg/l minimum at any time, 3.0 mg/l minimum 24-hour average.

Public and Agricultural Supply. This criterion is determined by the Aquatic Life Habitat or the Nuisance Prevention use designation assigned to the stream segment.

Ohio River. 4.0 mg/L minimum at any time, 5.0 mg/L minimum average. 5.0 mg/L minimum at any time during April 15 - June 15.

Lake Erie. 6.0 mg/L minimum at any time.

Oklahoma³⁶

Secondary Warm Water Fishery.

(April 1 - June 15) Not less than 4.0 mg/l.

(June 16 - March 31) Not less than 3.0 mg/l.

Primary Warm Water Fishery.

(April 1 - June 15) Not less than 6.0 mg/l.₁

(June 16 - October 15) Not less than 5.0 mg/l.₁

(October 16 - March 31) Not less than 5.0 mg/l.

Smallmouth Bass/Trout.

(March 1 - May 30) Not less than 7.0 mg/l.₁

(June 1 - October 15) Not less than 6.0 mg/l.₁

(October 16 - February 28) Not less than 6.0 mg/l.

1. Because of natural diurnal dissolved oxygen fluctuation, a 1.0 mg/l dissolved oxygen concentration deficit shall be allowed for not more than eight (8) hours during any twenty-four (24) hour period.

Oregon³⁷

Fresh waters. DO concentrations not less than 90 percent of saturation at the seasonal low, or less than 95 percent of saturation in spawning areas during

State

Designated Use and Criteria Value

spawning, incubation, hatching and fry stages of salmonid fishes.

Marine and Estuarine waters. (Outside of zones of upwelled marine waters naturally deficient in DO): DO concentrations shall not be less than 6 mg/l for estuarine waters, or less than saturation concentrations for marine waters.

Pennsylvania³⁸

DO₁. Minimum daily average 6.0 mg/l; no value less than 5.0 mg/l. For lakes, ponds and impoundments only, no value less than 5.0 mg/l at any point.

DO₂. Minimum daily average 5.0 mg/l; no value less than 4.0 mg/l. For the epilimnion of lakes, ponds and impoundments, minimum daily average of 5.0 mg/l, no value less than 4.0 mg/l.

DO₃. Minimum daily average not less than 5.0 mg/l; during periods 4/1 - 6/15 and 9/16 - 12/31 not less than 6.5 mg/l as a seasonal average.

DO₄. Minimum daily average not less than 3.5 mg/l; during periods 4/1 - 6/15 and 9/16 - 12/31, not less than 6.5 mg/l as a seasonal average.

DO₅. For the period 2/15 - 7/31 of any year, minimum daily average of 6.0 mg/l, no value less than 5.0 mg/l. For the remainder of the year, minimum daily average of 5.0 mg/l, no value less than 4.0 mg/l.

DO₆. No value less than 7.0 mg/l.

Rhode Island³⁹

Class A. 75% saturation, 16 hours/day, but not less than 5 mg/l at any time.

Class B. 75% saturation, 16 hours/day, but not less than 5 mg/l at any time.

Class C. Minimum 5 mg/l any time. Normal seasonal and diurnal variations above 5 mg/l will be maintained.

Class D. A minimum of 2 mg/l at any time.

Class SA. Not less than 6.0 mg/l at any time.

Class SB. Not less than 5.0 mg/l at any time.

Class SC. Not less than 5 mg/l during at least 16 hours of any 24-hour period not less than 4 mg/l at any time.

State

Designated Use and Criteria Value

South Carolina⁴⁰

Class AA, SAA. Natural conditions will be maintained and protected as feasible, within the Department's statutory authority.

Class A-Trout, B-Trout. Not less than 6 mg/l.

Class A, B, SA, SB. Daily average not less than 5 mg/l with a low of 4 mg/l.

Class SC. Not less than 4 mg/l.

South Dakota⁴¹

Coldwater permanent fish life propagation waters. Shall be greater than 6.0 mg/l with a variation allowed under subdivision 74:03:02:32(1).

In spawning areas during the spawning season shall be greater than 7.0 mg/l with a variation allowed under subdivision 74:04:02:32(1).

Warmwater semipermanent fish life propagation waters. Shall be greater than 5.0 mg/l with a variation allowed under subdivision 74:03:02:32(1).

Warmwater marginal fish life propagation waters. Shall be greater than 4.0 mg/l with a variation allowed under subdivision 74:03:02:32(1).

Immersion recreation waters, and limited contact recreation waters. Shall be greater than 5.0 mg/l with a variation allowed under subdivision 74:03:02:32(1).

Tennessee⁴²

Domestic Water Supply, Industrial Water Supply, Recreation, Irrigation, and Livestock Watering and Wildlife. There shall always be sufficient dissolved oxygen present to prevent odors of decomposition and other offensive conditions.

Fish and Aquatic Life. The dissolved oxygen shall be a minimum of 5.0 mg/l except in limited sections of streams where it can be clearly demonstrated that (i) the existing quality of the water due to irretrievable man-induced conditions cannot be restored to the desired minimum of 5.0 mg/l dissolved oxygen; (ii) the cost for application of effluent limitations more stringent than those defined through Section 301(b) of the Federal Water Pollution Control Act (PL 92-500) is economically prohibitive when compared with the benefits to be obtained; or (iii) the natural qualities of the water are less than the desired minimum of 5.0 mg/l. Such exceptions shall be

State

Designated Use and Criteria Value

determined on an individual basis but in no instance shall the dissolved oxygen concentration be less than 3.0 mg/l. The dissolved oxygen concentration shall be measured at mid-depth in waters having a total depth of ten (10) feet or less and at a depth of five (5) feet in waters having a total depth of greater than ten (10) feet. The dissolved oxygen concentration of recognized trout streams shall not be less than 6.0 mg/l. The above criteria are applicable to tailwaters.

Texas⁴³

All values are presented as Mean/Minimum in mg/l

Exceptional Aquatic Life

Freshwater - 6.0/4.0

Freshwater in Spring - 6.0/5.0

High Aquatic Life

Freshwater - 5.0/3.0

Freshwater in Spring - 5.5/4.5.

Intermediate Aquatic Life

Freshwater - 4.0/3.0

Freshwater in Spring - 5.0/4.0

Limited Aquatic Life

Freshwater - 3.0/2.0

Freshwater in Spring - 4.0/3.0

Dissolved oxygen for unclassified waters.

Unclassified waters which are perennial or support perennial aquatic life uses are designated for the specific uses that are existing or characteristic of those waters. In instances where the executive director of the commission determines that little or no information is available to assess those uses, the waters will be preliminarily assumed to have a limited aquatic life use and associated criteria, as defined in §307.7 of this title (relating to Site-specific Uses and Criteria). Upon administrative or regulatory action by the commission which affects a particular unclassified water body, the characteristics of the affected water body will be reviewed to determine which aquatic life uses are appropriate. Additional uses so determined shall be indicated in public notices for discharge applications. Uses which are not applicable throughout the year in a particular unclassified water body will be assigned and protected for the seasons in which such uses occur. Initial determinations of use shall be considered preliminary, and in no way preclude redeterminations of use in public hearings conducted by the commission under the provisions of the Texas Water Code.

State

Designated Use and Criteria Value

Utah⁴⁴

Domestic Source Class 1C, Recreation and Aesthetics Classes 2A, 2B. Not less than 5.5 mg/l.

Aquatic Wildlife Class 3A, Not less than 6.5 mg/l for 30 day average, 9.5/5.0* mg/l for 7 day average, or 8.0/4.0 for 1 day average.

Aquatic Wildlife Class 3B, Not less than 5.5 mg/l for 30 day average, 6.0/4.0* mg/l for 7 day average, or 5.0/3.0 for 1 day average.

Aquatic Wildlife Class 3C & 3D. Not less than 5.0 mg/l for 30 day average or 3.0 for 1 day average.

*1st number for when early life stages are present.
2nd number for all other life stages.

Vermont⁴⁵

Cold Water Fish
Habitat

Not less than 7 mg/l or 75 percent saturation at all times, nor less than 95 percent saturation during late egg maturation and larval development of salmonids in areas which the Secretary determines are salmonid spawning or nursery areas important to the establishment or maintenance of the fishery resource. Not less than 6 mg/l or 70 percent saturation at all times in all other waters designated as a cold water fish habitat.

Warm Water Fish
Habitat

Not less than 5 mg/l or 60 percent saturation at all times.

Virginia⁴⁶

Class I—Open Ocean. Minimum of 5.0 mg/l.

Class II—Estuarine Waters. Minimum of 4.0 mg/l. Daily average of 5.0 mg/l.

Class III—Non-tidal Waters. Same as Class II.

Class IV—Mountainous Zone Waters. Same as Class II.

Class V—Put and Take Trout Waters. Minimum of 5.0 mg/l. Daily average of 6.0 mg/l.

Class VI—Natural Trout Waters. Minimum of 6.0 mg/l. Daily average of 7.0 mg/l.

Class VII—Swamp Water. The natural quality of swamp water may fall outside of the ranges for DO set forth above; therefore, on a case-by-case basis, standards

State

Designated Use and Criteria Value

for specific swamp waters can be developed that reflect what natural quality is.

Washington⁴⁷

Class AA (Extraordinary). Freshwater shall exceed 9.5 mg/l. Marine water shall exceed 7.0 mg/l when natural conditions, such as upwelling occur, causing the dissolved oxygen to be depressed near or below 7.0 mg/l; natural dissolved oxygen levels can be degraded by up to 0.2 mg/l by man-caused activities.

Class A (Excellent). Freshwater shall exceed 8.0 mg/l. Marine water shall exceed 6.0 mg/l, except when the natural phenomenon of upwelling occurs, natural dissolved oxygen levels can be degraded by up to 0.2 mg/l by man-caused activities.

Class B (Good). Freshwater shall exceed 6.5 mg/l. Marine water shall exceed 5.0 mg/l. When natural conditions such as upwelling occur, causing the dissolved oxygen to be depressed near or below 5.0 mg/l, natural dissolved oxygen levels can be degraded by up to 0.2 mg/l by man-caused activities.

Class C (Fair). Shall exceed 4.0 mg/l. When natural conditions such as upwelling occur, causing the dissolved oxygen to be depressed near or below 4.0 mg/l, natural dissolved oxygen levels can be degraded by up to 0.2 mg/l by man-caused activities.

Lake Class. No measurable decrease from natural conditions.

West Virginia⁴⁸

Kanawha River Basin. Not less than 4.0 mg/l at any time.

Ohio River Basin. Concentration shall average 5.0 mg/l per calendar day and shall not be less than 4.0 mg/l at any time or place outside the mixing zone.

Trout Waters. Not less than 7.0 mg/l in spawning areas, and in no case less than 6.0 mg/l at any time.

Categories A, B, and C. Not less than 5.0 mg/l at any time.

Wisconsin⁴⁹

Fish and Aquatic Life. Except for waters classified as trout streams in Wisconsin Trout Streams. Publication 213-72, the dissolved oxygen content in surface waters shall not be lowered to less than 5 mg/l at any time.

State

Designated Use and Criteria Value

Dissolved oxygen in classified trout streams shall not be artificially lowered to less than 6.0 mg/l at any time, nor shall the dissolved oxygen be lowered to less than 7.0 mg/l during the spawning season.

The dissolved oxygen in great lakes tributaries used by stocked salmonids for spawning runs shall not be lowered below natural background during the period of habitation.

Intermediate Aquatic Life. DO shall not be less than 3 mg/l.

Marginal Surface Waters. DO shall not be less than 1 mg/l.

Wyoming⁵⁰

In all Class I and II waters, wastes attributable to or influenced by the activities of man shall not be present in amounts which will result in death or injury to existing aquatic life or which will result in a dissolved oxygen content of less than 6 mg/l at any time.

In all Class III waters, wastes attributable to or influenced by the activities of man shall not be present in amounts which will result in injury or death to existing aquatic life or which will result in a dissolved oxygen content of less than 5 mg/l at any time.

Over spawning areas, wastes attributable to or influenced by the activities of man shall not be present in amounts which will cause reduction in the natural dissolved oxygen content, unless such reduction is the result of a thermal discharge allowed under the provisions contained in Section 25 of these regulations.

American Samoa⁵¹

All Fresh Surface Waters. Not less than 75% saturation or less than 6.0 mg/l. If the natural level of DO is less than 6.0 mg/l, the natural level shall become the standard.

Open Coastal Nearshore Waters, Oceanic Waters. Not less than 80% of saturation or less than 5.5 mg/l. If the natural level of DO is less than 5.5 mg/l, the natural level shall become the standard.

For DO standards of specific embayments, see p. 21-23 of Water Quality Standards for American Samoa.

State

Designated Use and Criteria Value

District of Columbia⁵²

Class C. Minimum daily average of 5.0 mg/l (3 samples per 24 hours once per 8 hours), with an instantaneous minimum of 4.0 mg/l.

Guam⁵³

All waters. Shall not be decreased below 75 percent saturation at any time, as influenced by salinity of naturally occurring temperature variations. Where natural conditions cause lower DO levels, controllable water quality factors shall not cause further reductions.

Northern Mariana Islands⁵⁴

Except from natural causes, the following standards apply:

Class AA,1 -- Not less than 6.0 mg/l.

Class A -- Not less than 5.0 mg/l.

Puerto Rico⁵⁵

Class SA. Shall not be altered except by natural causes.

Class SB. Shall contain not less than 5 mg/l, except when natural phenomena cause this value to be depressed.

Class SC. Shall contain not less than 4 mg/l, except when natural phenomena cause this value to be depressed.

Class SD. Shall contain not less than 5.0 mg/l except during not more than 4 hours within any 24 hour period when it can contain no less than 4.0 mg/l, except when natural conditions cause this value to be depressed.

Trust Territory⁵⁶

All waters. Shall not vary by more than 25% from natural conditions.

Except for natural causes, DO concentration for the following classes shall not be less than:

Class AA, 1 -- 6.0 mg/l or 75% of saturation, whichever is greater.

Class A, 2 -- 5.0 mg/l.

Class B -- 4.5 mg/l.

State

Virgin Islands57

Designated Use and Criteria Value

Class A. Existing natural conditions shall not be changed.

Class B. Not less than 5.5 mg/l from other than natural conditions.

Class C. Not less than 5.0 mg/l from other than natural conditions.