Appendix A

2005 CDM White Paper Summarizing State Stream Standards

CDM

Memorandum

To: *Stormwater Quality Standards Task Force*

From: *CDM*

Date: *December 7, 2005*

Subject: *Review of State Recreational Uses and Bacteria Objectives*

Introduction

A comprehensive review of state water quality standards was conducted to characterize freshwater recreational beneficial uses and associated water quality objectives for bacteria. This review was conducted to identify the following:

- The range of approved recreational uses and their associated bacteria objectives
- How water quality standards for states compare with recommended U.S. Environmental Protection Agency (EPA) federal water quality standards for bacteria
- Alternative approaches to implement bacteria water quality objectives or assess compliance

Methodology

For each state, two general pieces of information were sought from the state's adopted water quality standards:

- Approach for designating freshwaters with recreational uses
- Objectives associated with each recreational use category

In a couple of instances information regarding proposed standards is provided if the proposed changes substantively change the existing standards. In addition, any language contained in the water quality standards regarding implementation, e.g., seasonal applicability and flow exemptions, was documented – but only if the information was contained in the water quality standards regulations. State implementation documents were not reviewed; thus, to fully understand the nuances of how a particular provision is implemented in practice would require further investigation.

All 50 states were included in the analysis. For the most part, water quality standards information was gathered from the websites of the state agencies responsible for the development and implementation of water quality standards. In several instances, primarily

at the direction of the Task Force, the state agency was contacted directly to gather additional information.

Results and Discussion

State by state summaries of recreational uses and objectives are provided in Appendix A. Table 1 provides a guide to the state-by-state summaries per EPA regions.

Table 1 Location of State-by-State Summaries in Appendix A

EPA Region	State	Page No.	EPA Region	State	Page No.
Region 1	Connecticut	10	**Region 7**	Iowa	36
	Maine	10		Kansas	37
	Massachusetts	11		Missouri	41
	New Hampshire	12		Nebraska	41
	Rhode Island	12	**Region 8**	Colorado	42
	Vermont	13		Montana	43
Region 2	New Jersey	14		North Dakota	44
	New York	14		South Dakota	44
Region 3	Delaware	15		Utah	45
	Maryland	15		Wyoming	45
	Pennsylvania	16	**Region 9**	Arizona	46
	Virginia	16		California	47
	West Virginia	17		California - North Coast (1)	48
Region 4	Alabama	18		California - San Francisco Bay (2)	48
	Florida	20		California - Central Coast (3)	50
	Georgia	20		California - Los Angeles (4)	50
	Kentucky	21		California - Central Valley (5)	51
	Mississippi	21		California - Lahonton (6)	52
	North Carolina	23		California - Colorado River (7)	52
	South Carolina	23		California - Santa Ana (8)	53
	Tennessee	24		California - San Diego (9)	53
Region 5	Illinois	24		Hawaii	54
	Indiana	25		Nevada	55
	Michigan	25	**Region 10**	Alaska	56
	Minnesota	27		Idaho	56
	Ohio	29		Oregon	57
	Wisconsin	31		Washington	58
Region 6	Arkansas	32			
	Louisiana	33			
	New Mexico	33			
	Oklahoma	34			
	Texas	35			

The following sections provide a summary of the commonalities among states as well as the unique and interesting approaches used by states to establish water quality standards regulations to protect recreational activities.

Recreational Use Categories

States are using two basic approaches for establishing recreational uses in freshwaters:

- Use-based - Establishing the recreational uses and then applying them to specific waterbodies, e.g., application of a REC-1 use to the Santa Ana River.
- Class-based - Establishing "classes" of waters and then assigning combinations of uses, including recreational uses, to the established classes. For example, Class A or Class 1 is typically used to identify waters with the best expectations for water quality and have uses with the most restrictive objectives.

Interestingly, the class-based approach seems to be more common in the east than in the west where the use-based approach appeared to be more common (western exceptions are Montana and Wyoming). While fundamentally different, the alternative approaches have little bearing on the water quality objectives established. However, for states using a class-based approach it was often unclear how the state assigns a waterbody to a particular class.

Overall, it appeared that there was more similarity among states within EPA regions in their approach for protecting recreational uses than between states in different EPA regions. This observation is not particularly surprising since states within the same EPA region would likely receive similar guidance on how to develop approvable water quality standards.

States use various terminologies to recognize two basic types of recreational uses. These types and examples of alternative terminology include: primary contact (full-body contact, immersion recreation) and secondary contact (partial-body contact, incidental contact). Without exception the former refers to situations where water ingestion or submergence is likely as a result of recreational activity; the latter refers to situations where ingestion or submergence is unlikely.

All states have established some form of primary contact use. In addition, it is fairly common for states to have also established a secondary contact use, e.g., Massachusetts, Rhode Island, Kentucky, Mississippi, Ohio, Iowa, Kansas, Missouri, Oklahoma, Louisiana, Arkansas, New Mexico, Texas, Colorado, Montana, South Dakota, Utah, Wyoming, Arizona, Nevada, and Idaho.

Some states have not established a separate use for secondary contact, but instead established a seasonal exemption, which for all practical purposes serves the same purpose as establishing a secondary contact use. Examples include: Indiana, Maine, Vermont, Georgia, and North Dakota.

Water Quality Objectives

Considerable variation was found from state to state regarding the objectives applicable to recreational uses. The following text provides some general observations, but the details can be important and should be reviewed for each state (see Table 1, Appendix A).

Type of Bacteria Objectives

Although EPA guidance has recommended since 1986 that states use *E. coli* as the primary freshwater pathogen indicator applicable to recreational uses, many states still rely on fecal coliform as the primary pathogen indicator. Some states still rely on both fecal coliform and *E. coli*; and, interestingly, a few eastern states still use both fecal and total coliform objectives (e.g., see New York, Rhode Island, Pennsylvania, and Florida). Two states rely on only *Enterococcus* for both fresh and marine waters: Delaware and Hawaii.

Water Quality Objectives

States typically adopt numeric objectives for pathogen indicators. However, some examples of narrative objectives were identified. Accordingly, narrative and numeric objectives are discussed separately.

Narrative Objectives

Several states rely on a narrative objective rather than numeric objective for situations where a secondary contact type use is applicable – either because the waterbody is designated as such or because of a seasonal exemption, i.e., primary contact recreation does not apply. Examples of states with narrative objectives include:

- Oklahoma – Waters so designated [secondary body contact recreation] shall be maintained to be free from human pathogens in numbers that may produce adverse health effects in humans. The water quality requirements for secondary body contact recreation are usually not as stringent as for primary body contact recreation.
- Rhode Island, for Class C waters – none [bacteria] in such concentrations that would impair any usages specifically assigned to this class.
- Mississippi, for ephemeral waters – bacteria objectives are assigned where the "probability of a public health hazard or other circumstances so warrant."

To fully understand how these narrative objectives are implemented in practice would require further investigation.

Numeric Objectives

The most commonly observed objectives for primary contact recreation were derived from EPA guidance either for fecal coliform or *E. coli* (Note: A few states have more stringent objectives for primary contact for certain classes of waters, e.g., see Maine, New Hampshire, Rhode Island, and Vermont):

- Fecal coliform – 200 colony forming units (cfu)/100 mL (geometric mean) and 400 cfu/100 mL (single sample maximum or 10 percent of observations)
- *E. coli* – 126 cfu/100 mL (geometric mean) and 235 cfu/100 mL (single sample maximum or 10 percent of observations)

EPA has not provided clear guidance on the establishment of secondary contact recreation objectives for *E. coli*, but does indicate that objectives that are five times higher than the primary contact objectives may be acceptable. This "five times" approach is often used with fecal coliform, where states use 1,000 (geometric mean) and 2,000 cfu/100 mL (single sample or 10 percent of samples) for secondary contact instead of the 200 and 400 cfu/100 mL used for primary contact. A review of the state's objectives found that states have a variety of objectives for secondary contact recreation ranging from only slightly less stringent than primary contact objectives to substantially different. Following are some examples of secondary contact objectives adopted by states to illustrate the range of approved approaches:

- Massachusetts – Class C waters shall not exceed a geometric mean of 1,000 cfu/100 mL, nor shall 10 percent of the samples exceed 2,000 cfu/100 mL.
- Delaware – Geometric mean of *Enterococcus* shall not exceed 500 cfu/100 mL; single sample shall not exceed 925 cfu/100 mL.
- Kentucky – Fecal coliform shall not exceed 1,000 cfu/100 mL as a 30-day geometric mean based on not less than five samples; not exceed 2,000 cfu/100 mL in 20 percent or more of all samples taken during a 30-day period.
- Ohio – Fecal coliform shall not exceed 5,000 cfu/100 mL in more than 10 percent of the samples taken during any 30-day period; *E. coli* shall not exceed 576 cfu/100 mL in more than 10 percent of the samples taken during any 30-day period.
- Iowa – March 15 to November 15 – *E. coli* 630 cfu/100 mL geometric mean; 2,880 cfu/100 mL single sample maximum; remainder of the year the bacteria objectives do not apply.
- Kansas – For stream segments, geometric mean objectives, Class A – *E. coli* 2,358 cfu/100 mL; Class B – 3,843 cfu/100 mL; lake/reservoir/pond geometric mean objectives slightly more stringent.
- Louisiana – No more than 25 percent of the total samples collected on a monthly or near monthly basis shall exceed a fecal coliform density of 2,000 cfu/100 mL
- Arkansas – Fecal coliform shall not exceed a geometric mean of 1,000 cfu/100 mL, or a monthly maximum of 2,000 cfu/100 mL. *E. coli* values shall not exceed the geometric mean of 630 cfu/100 mL or a monthly maximum of 1,490 cfu/100 mL for lakes, reservoirs and Extraordinary Resource Waters, and 2,050 cfu/100 mL for other rivers and streams.

- New Mexico – New Mexico uses an acceptable illness rate of 14 in 1,000 to establish its geometric mean for secondary contact (548 cfu/100 mL). The single sample objective of 2,507 cfu/100 mL is based on the 95 percent confidence level of infrequently used waters.
- Texas – The geometric mean of *E. coli* should not exceed 605 cfu/100 mL.
- Colorado – *E. coli*, 630 cfu/100 mL, geometric mean; fecal coliform, 2,000 cfu/100 mL, geometric mean.
- South Dakota – Applicable only from May 1 to September 30; fecal coliform ≤ 1,000 cfu/ 100 mL geometric mean based on a minimum of five samples obtained during separate 24-hour periods for any 30-day period, and they may not exceed this value in more than 20 percent of the samples in this same 30-day period. No single sample may exceed 2,000 cfu/100 mL.
- Utah – *E. coli*, 576 cfu/100 mL, 30-day geometric mean; 940 cfu/100 mL single sample maximum.
- Arizona (Idaho has similar objectives) – Geometric mean (four-sample minimum) 126 cfu/100 mL; single sample maximum of 576 cfu/100 mL.
- California – The secondary contact objectives (REC-2) applicable to California's waters vary across the nine state regions. Region 6 applies the most stringent criteria, using the same criteria to protect both REC-1 and REC-2. However, two regions have no REC-2 objectives (Regions 1, 5) and two regions have qualifiers indicating that the REC-2 criteria only apply if the waterbody is not designated REC-1 (Regions 4, 9).

Use of Seasonal Exemptions

EPA guidance allows the establishment of seasonal exemptions for application of bacteria objectives to surface waters. Establishing this exemption recognizes that when water temperatures are too cold, the likelihood of recreational activity taking place in a manner that ingestion or body submersion occur decreases substantially. Two common approaches for using seasonal exemptions were observed:

- The exemption is total, such that no bacteria objectives apply during the season in which the exemption has been established, e.g., Maine, Illinois, Indiana, Ohio, Iowa, Missouri, South Dakota, and North Dakota.
- The primary contact objectives are replaced with less restrictive or secondary contact objectives during the seasonal exemption, e.g., Pennsylvania, Georgia, Oklahoma, Arkansas, Louisiana, Kansas, Montana, and Wyoming.

Some variations of the above exist:

- Vermont allows a provisional seasonal exemption, which is implemented as a waiver under an NPDES permit.

- Kentucky replaces the primary contact single sample maximum objective with the secondary contact objective from November through April. However, it appears that the geometric mean objective is applicable year-round.
- Minnesota has different seasonal exemption periods depending on whether the waterbody is protected for primary or secondary contact recreation. For the former the exemption exists between November 1 and March 31. For waters protected only for secondary contact, the exemption exists from November 1 to April 30.

For the most part, the seasonal exemption exists for the months November 1 through March 31. However, a few states, e.g., North and South Dakota and Wyoming, have longer exemptions lasting from October 1 through April 30.

Unique and Interesting Elements

A number of interesting elements incorporated into specific state water quality standards were noted. Most of these elements are generally implementation related and can affect how permits are implemented or how bacteria objectives are assessed. Some of the more interesting examples are highlighted below:

- Georgia, Washington, and New Hampshire have rule language that indicates recognition that non-human sources of bacteria may impact compliance with a water quality objective. Only Georgia has established alternative objectives where a non-human component has been identified (see italicized language); however, the state is considering removing these alternative objectives in a future standards revision. The current language is as follows:

  > For the months of May through October, when water contact recreation activities are expected to occur, fecal coliform not to exceed a geometric mean of 200 cfu/100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. *Should water quality and sanitary studies show fecal coliform levels from nonhuman sources exceed 200 cfu/100 mL (geometric mean) occasionally, then the allowable geometric mean fecal coliform shall not exceed 300 per 100 mL in lakes and reservoirs and 500 per 100 mL in free flowing freshwater streams.*

- Several states have statements in their water quality standards relating to the need to disinfect wastewater only during recreational periods. For example:
  - Connecticut states that "recreational uses in Class B waters do not apply when disinfection of effluent is not required consistent with Standard 23" (Note: Standard 23 allows for seasonal disinfection in certain parts of the state).
  - New York's standards state that "the total and fecal coliform standards for Classes B, C, and D shall be met during all periods when disinfection is practiced." It was not clear from the standards when this rule would be applied, but it suggests that disinfection is not required during certain times of the year.

- Arkansas has a unique method for deciding where primary or secondary contact applies. If a watershed is greater than 10 mi^2 in area, then primary contact applies. For smaller watersheds, primary contact is applied only after "site verification."
- Florida exempts "secondary and tertiary canals" from recreational standards.
- Arizona has agricultural and public water supply uses established on many canals (so-called Phoenix area and Yuma area canals), but no recreational uses.
- Most states have geometric means as part of their bacteria objectives and apply them on a 30-day basis. Three notable exceptions were observed:
  - Louisiana applies no geometric mean. For example, the primary contact objective states: "No more than 25 percent of the total samples collected on a monthly or near monthly basis shall exceed a fecal coliform density of 400 cfu/100 mL."
  - New Hampshire uses a 60-day geometric mean.
  - Nevada applies an annual geometric mean for many of its waters that have *E. coli* geometric mean objectives established.
- Kansas has the most number of recreation use subcategories of any state. Uses have been separated for lakes and streams, and the state has recognized public access potential as part of its basis for classifying waters. In its approval letter(Appendix B), EPA notes that access may not be used as a basis for establishing uses and objectives; however, because the objectives associated with the access-based subcategories were appropriately derived using a risk management approach (consistent with EPA guidance), EPA approved the Kansas regulations.
- Kansas and California Region 4 appear to be the only jurisdictions reviewed that have established a high flow exemption.
- Illinois water quality standards include a statement that provides an off-ramp from application of bacteria water quality objectives if certain conditions exist: "Waters unsuited to support primary contact uses because of physical, hydrologic, or geographic configuration and are located in areas unlikely to be frequented by the public on a routine basis as determined by the Agency are exempt from this standard." It is unknown how this narrative statement is implemented in practice.
- Wisconsin has established a substantial variance in the "Southeast District" of the state that includes a heavily urbanized area. For a number of waters, the applicable objectives for fecal coliform shall not exceed 1,000 cfu/100 mL as a monthly geometric mean based on not less than five samples per month nor exceed 2,000 cfu/100 mL in more than 10 percent of all samples during any month.
- Iowa recognizes a use subcategory for children recreational activity; however, the objectives are the same as the objectives for adult primary contact.

- In Idaho a single water sample exceeding an *E. coli* standard does not in itself constitute a violation of water quality standards, additional samples shall be taken for the purpose of comparing the results to the geometric mean objectives.
- Idaho has successfully conducted use attainability analyses (UAAs) that recognize safety as a factor for reclassifying waters from primary to secondary contact.

Appendix A – Summary of State Water Quality Standards for Protection of Recreational Uses

EPA Region 1

Connecticut

Recreational Use Categories

The state has adopted a general definition for recreational use – active or passive water-related leisure activities such as fishing, swimming, boating, and aesthetic appreciation.

Numeric Objectives

Connecticut's bacteria objectives for freshwaters are as follows (Note: it is not clear how these categories and classes are applied to specific waters):

- Designated Swimming; Classes AA, A, or B – *E. coli*, geometric mean less than 126 cfu/ 100 mL; single sample maximum 235/100 mL
- Non-designated Swimming AA, A, or B – *E. coli*, geometric mean less than 126/100 mL; single sample maximum 410 cfu/100 mL
- All Other Recreational Uses AA, A, B – *E. coli*, geometric mean less than 126/100 mL; single sample maximum 576 cfu/100 mL

Standards note that recreational uses in Class B waters do not apply when disinfection of effluent is not required consistent with "Standard 23" (allows for seasonal disinfection only in certain parts of the state).

Maine

Recreational Use Categories

No specific recreational uses have been defined; instead, surface waters are organized by classes (AA, A, B, and C). Each class has specific bacteria objectives.

Numeric Objectives

Bacteria objectives dependent on the waterbody class:

- Class AA and A – Bacteria of waters shall be as naturally occurs
- Class B – Between May 15 and September 30, the number of *E. coli* bacteria of human origin in these waters may not exceed a geometric mean of 64 cfu/100 mL or an instantaneous level of 427 cfu/100 mL
- Class C - Between May 15 and September 30, the number of *E. coli* bacteria of human origin in these waters may not exceed a geometric mean of 142 cfu/100 mL or an instantaneous level of 949 cfu/100 mL

At the request of the Task Force, to better understand how Maine implements the provision regarding bacteria "of human origin," Susan Davies of the Maine Department of Environmental Protection was contacted. Her response was as follows:

> "We have been interested in the microbial source tracking library for New England but it has had limited success. We don't have any sophisticated diagnostic methods of our own. Our management approach is more based on logical and reasonable expectations. We make some assumptions that *E. coli* and *Enterococci* are indicative of 'human origin'. Recreational uses are managed by only applying the bacterial standards during 'reasonable' swimming seasons for Maine. If there are not any sources of human activity in minimally disturbed watersheds (a very common circumstance in northern and Downeast Maine), we generally assume that bacteria are caused by wildlife, and are not of human origin, and therefore not a water quality problem that can be reasonably addressed by state management. We are interested in the recent bacterial DNA research that Jack Parr at [the] EPA Regional Lab in Chelmsford, MA has reported on, but it is not ready for use in monitoring yet. Unfortunately we don't have any other tricks to diagnose 'of human and domestic origin'."

Massachusetts

Recreational Use Categories

- Primary Contact Recreation – Any recreation or other water use in which there is prolonged and intimate contact with the water with a significant risk of ingestion of water. These include, but are not limited to, wading, swimming, diving, surfing, and water skiing.
- Secondary Contact Recreation – Any recreation or other water use in which the contact with the water is either incidental or accidental. These include but are not limited to fishing, boating, and limited contact incident to shoreline activities.

Inland waters divided into Classes A, B, and C. Primary and Secondary Contact Recreation apply to both Classes A and B; only Secondary Contact Recreation applies to Class C.

Numeric Objectives

The following fecal coliform objectives apply to each of the waterbody classes:

- Class A – Shall not exceed an arithmetic mean of 20 cfu/100 mL in any representative set of samples, nor shall 10 percent of the samples exceed 100 cfu/100 mL. More stringent regulations may apply for specific waters.
- Class B – Shall not exceed a geometric mean of 200 cfu/100 mL in any representative set of samples nor shall more than 10 percent of the samples exceed 400 cfu/100 mL. This criterion may be applied on a seasonal basis at the discretion of the Department.
- Class C – Shall not exceed a geometric mean of 1,000 cfu/100 mL, nor shall 10 percent of the samples exceed 2,000 cfu/100 mL.

New Hampshire

Recreational Use Categories

Waters divided into Class A ("highest quality") and B ("second highest quality"). It was not apparent how waters are classified as A or B.

Numeric Objectives

- Class A – shall contain not more than either a geometric mean based on at least three samples obtained over a 60-day period of 47 *E. coli*/100 mL, or > 153 *E. coli*/100 mL in any one sample; and for designated beach areas shall contain not more than a geometric mean based on at least three samples obtained over a 60-day period of 47 *E. coli*/100 mL, or 88 *E. coli*/ 100 mL in any one sample; unless naturally occurring. There shall be no discharge of any sewage or wastes into waters of this classification.
- Class B – shall contain not more than either a geometric mean based on at least three samples obtained over a 60-day period of 126 *E. coli*/100 mL, or > 406 *E. coli*/100 mL in any one sample; and for designated beach areas shall contain not more than a geometric mean based on at least three samples obtained over a 60-day period of 47 *E. coli*/100 mL, or 88 *E. coli*/100 mL in any one sample; unless naturally occurring.

Rhode Island

Recreational Use Categories

- Primary Contact Recreation – any recreational activities in which there is prolonged and intimate contact by the human body with the water, involving considerable risk of ingesting waters, such as swimming, diving, water skiing, and surfing.
- Secondary Contact Recreation – any recreational activities in which there is minimal contact by the human body with the water, and the probability of ingestion of the water is minimal, such as boating and fishing.

Classification of waters dictates which uses apply:

- Class A, B, B1 – protected for both primary and secondary contact recreational activities
- Class C – protected only for secondary contact recreation

Numeric Objectives

- Class A Waters
  - Total Coliform – Not to exceed a geometric mean value of 100 and not more than 10 percent of the samples shall exceed a value of 500.
  - Fecal Coliform – Not to exceed a geometric mean value of 20 and not more than 10 percent of the samples shall exceed a value of 200.
- Class B Waters

  - Total Coliform - Not to exceed a geometric mean value of 1,000 and not more than 20 percent of the samples shall exceed a value of 2,400.
  - Fecal Coliform - Not to exceed a geometric mean value of 200 and not more than 20 percent of the samples shall exceed a value of 500.
- Class C Waters
  - None in such concentrations that would impair any usages specifically assigned to this class.

Vermont

Recreational Use Categories

Waters divided into Class A(1) Ecological Waters (high quality waters). Class A(2) Public Water Supplies and Class B Waters . All classes protected for "Swimming and other Primary Contact Recreation."

The definitions for "Swimming and other Primary Contact Recreation" vary depending on the class:

- Class A(1) – highest quality in waters, in their natural condition with negligible risk of illness or injury from conditions that are a result of human activities.
- Class A(2) – in waters that pose negligible risk of illness due to conditions that are a result of human activities but managed as necessary for consistency with use as a public water supply.
- Class B – waters suitable for swimming and other forms of water based recreation where sustained direct contact with the water occurs and, where attainable, suitable for these uses at very low risk of illness based on Water Management Type designation.

Numeric Objectives

- Class A(1) and A(2) – *E. coli* - Not to exceed a geometric mean based on at least three samples obtained over a 30 day period of 18 cfu/100 mL, no single sample above 33 cfu/ 100 mL. No bacteria attributable to the discharge of wastes.
- Class B – *E. coli* not to exceed 77 cfu/100mL. The Secretary may, by permit condition, waive compliance with this criterion during all or any portion of the period between October 31 and April 1, provided that a health hazard is not created. The Secretary shall provide written notice to the Vermont Department of Health prior to issuing a permit waiving compliance with the *E. coli* criterion.

EPA Region 2

New Jersey

Recreational Use Categories

The primary and secondary contact recreation uses generally apply to all freshwaters.

- Primary Contact Recreation - water related recreational activities that involve significant ingestion risks and includes, but is not limited to, wading, swimming, diving, surfing, and water skiing.
- Secondary Contact Recreation - recreational activities where the probability of water ingestion is minimal and includes, but is not limited to, boating and fishing.

Numeric Objectives

The following objectives apply to all freshwaters:

- Fecal coliform levels shall not exceed a geometric average of 200 cfu/100 mL nor should more than 10 percent of the total samples taken during any 30-day period exceed 400 cfu/100 mL.
- *Enterococci* levels shall not exceed a geometric mean of 33 cfu/100 mL, nor shall any single sample exceed 61 cfu/100 mL.
- Samples shall be obtained at sufficient frequencies and at locations during periods that will permit valid interpretation of laboratory analyses. As a guideline and for the purpose of these regulations, a minimum of five samples as equally spaced over a 30-day period, as feasible, should be collected; however, the number of samples, frequencies, and locations will be determined by the Department or other appropriate agency in any particular case.

New York

Recreational Use Categories

Both recreational uses appear to be applicable to all classes of freshwaters.

- Primary Contact Recreation – recreational activities where the human body may come in direct contact with raw water to the point of complete body submergence. Primary contact recreation includes, but is not limited to swimming, diving, water skiing, skin diving, and surfing.
- Secondary Contact Recreation Mentioned - recreational activities where contact with the water is minimal and where ingestion of the water is not probable. Secondary contact recreation includes, but is not limited to, fishing and boating.

Numeric Objectives

- Total Coliform
  - Class AA – The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 50 and 240 cfu/100 mL, respectively.
  - Class A, B, C, D – The monthly median value and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000 cfu/100 mL, respectively.
  - Class A-Special – The geometric mean, of not less than five samples, taken over not more than a 30-day period shall not exceed 1,000 cfu/100 mL.
- Fecal Coliform
  - Class A, B, C, and D – The monthly geometric mean, from a minimum of five examinations, shall not exceed 200 cfu/100 mL.
  - Class A-Special – The geometric mean, of not less than five samples, taken over not more than a 30-day period shall not exceed 200 cfu/100 mL.

Standards include following note: The total and fecal coliform standards for Classes B, C, and D shall be met during all periods when disinfection is practiced. Not clear how this might affect application of objectives.

EPA Region 3

Delaware

Recreational Use Categories

- Primary Contact Recreation - Any water-based form of recreation, the practice of which has a high probability for total body immersion or ingestion of water (examples include but are not limited to swimming and water skiing).
- Secondary Contact Recreation - A water-based form of recreation, the practice of which has a low probability for total body immersion or ingestion of water (examples include but are not limited to wading, boating, and fishing).

Numeric Objectives

- Primary Contact Recreation (Freshwater) – Geometric mean of *Enterococcus* shall not exceed 100 cfu/100 mL; single sample shall not exceed 185 cfu/100 mL.
- Secondary Contact Recreation (Freshwater) – Geometric mean of *Enterococcus* shall not exceed 500 cfu/100 mL; single sample shall not exceed 925 cfu/100 mL.

Maryland

Recreational Use Categories

General Recreational Use classification, "Water Contact Recreation" is applicable to all surface waters.

Numeric Objectives
Maryland applies both *E. coli* and *Enterococcus* to freshwaters (cfu/100 mL):

		Single Sample Maximum Allowable Density			
Indicator	**Geometric Mean (All Areas)**	**Frequent Full Body Contact Recreation (Upper 75% CL)**	**Moderately Frequent Full Body Contact Recreation (Upper 82% CL)**	**Occasional Full Body Contact Recreation (Upper 90% CL)**	**Infrequent Full Body Contact Recreation (Upper 95% CL)**
Enterococci	33	61	78	107	151
E. coli	126	235	298	410	576

Pennsylvania

Recreational Use Categories
Recreational uses are subdivided into four categories – Boating, Fishing, Water Contact Sports, and Esthetics. Although it could not be confirmed, it appears that all four uses apply to all waterbodies unless it is has been demonstrated that the existing use is less restrictive.

Numeric Objectives
- Fecal coliform - During the swimming season (May 1 through September 30), the maximum fecal coliform level shall be a geometric mean of 200 cfu/100 mL based on a minimum of five consecutive samples each sample collected on different days during a 30-day period. No more than 10 percent of the total samples taken during a 30-day period may exceed 400/100 mL. For the remainder of the year, the maximum fecal coliform level shall be a geometric mean of 2,000 cfu/100 mL based on a minimum of five consecutive samples collected on different days during a 30-day period.
- Total coliform - Maximum of 5,000 cfu/100 ml as a monthly average value, no more than this number in more than 20 of the samples collected during a month, nor more than 20,000 cfu/100 mL in more than 5 percent of the samples.

Virginia

Recreational Use Categories
- Primary Contact Recreation - any water-based form of recreation, the practice of which has a high probability for total body immersion or ingestion of water (examples include but are not limited to swimming, water skiing, canoeing, and kayaking).
- Secondary Contact Recreation - a water-based form of recreation, the practice of which has a low probability for total body immersion or ingestion of waters (examples include but are not limited to wading, boating, and fishing).

Numeric Objectives
Fecal coliform bacteria shall not exceed a geometric mean of 200 cfu/100 mL for two or more samples over a calendar month nor shall more than 10 percent of the total samples taken during any calendar month exceed 400 cfu/100 mL. This criterion shall not apply for a

sampling station after the bacterial indicators described for *E. coli* have a minimum of 12 data points or after June 30, 2008, whichever comes first. The applicable *E. coli* objectives include a geometric mean of 126 cfu/100 mL and a single sample maximum of 235 cfu/100 mL:

West Virginia

Recreational Use Categories

West Virginia uses a class system for establishing beneficial uses. Only one recreational use class has been established - Category C, Water Contact Recreation. This category, which includes swimming, fishing, water skiing, and certain types of pleasure boating such as sailing in very small craft and outboard motor boats, is applied as follows:

> "Unless otherwise designated by these rules, at a minimum all waters of the State are designated for…Water Contact Recreation (Category C) consistent with Federal Act goals. Incidental utilization for whatever purpose may or may not constitute a justification for assignment of a water use category to a particular stream segment."

It is not clear what this statement means with regards to application. Elsewhere in the water quality standards, the text state: "See Appendix D for a representative list of category C waters." A review of Appendix D shows that this list includes only a portion of the state's waters. It is not clear how the state evaluates the applicability of water contact recreation to waters not on the list.

Numeric Objectives

With the exception of a seasonal exemption for the mainstem Ohio River, the following water quality objectives apply to all waters categorized as Category C or Category A (Public Water Supply):

- Maximum allowable level of fecal coliform content for Primary Contact Recreation (either MPN or MF) shall not exceed 200 cfu/100 mL as a monthly geometric mean based on not less than five samples per month; nor to exceed 400 cfu/100 mL in more than 10 percent of all samples taken during the month.
- Ohio River mainstem seasonal exemption – During the non-recreational season (November through April only) the maximum allowable level of fecal coliform for the Ohio River (either MPN or MF) shall not exceed 2,000 cfu/100 mL as a monthly geometric mean based on not less than five samples per month.

EPA Region 4

Alabama

Recreational Use Categories

Under the "General Conditions" section, the regulations state:

> "All waters, where attainable, shall be suitable for recreation in and on the waters during the months of June through September except that recreational use is not recommended in the vicinity of discharges or other conditions which the Department or the Department of Public Health does not control."

In assigning classifications to waters (choices include Public Water Supply, Outstanding Alabama Water, Swimming and Other Whole Body Water-Contact Sports ["Swimming"], Shellfish Harvesting, Fish and Wildlife, Limited Warmwater Fishery, Agricultural and Industrial Water Supply), the state applies the best use(s) to the water. The state's list of waters and their use classifications typically limits each designated waterbody to one or two classifications and many are not specifically listed for Swimming. However, per the "General Condition" listed above, Swimming is likely presumed to be attainable from June through September.

When specifically designating a waterbody for swimming, the following note, which is included in the water quality standards, applies:

> "In assigning this classification to waters intended for swimming and water-contact sports, the Commission will take into consideration the relative proximity of discharges of wastes and will recognize the potential hazards involved in locating swimming areas close to waste discharges. The Commission will not assign this classification to waters, the bacterial quality of which is dependent upon adequate disinfection of waste and where the interruption of such treatment would render the water unsafe for bathing."

Numeric Objectives

If waterbodies are designated with "Swimming" as the "best use" the following objectives apply:

(i) Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes are not acceptable for swimming or other whole body water-contact sports.

(ii) In all other areas, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean fecal coliform organism density does not

exceed 200 cfu/100 mL in non-coastal waters. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric mean bacterial organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters.

The following note applies to (i) above: In assigning this classification to waters intended for swimming and water-contact sports, the Commission will take into consideration the relative proximity of discharges of wastes and will recognize the potential hazards involved in locating swimming areas close to waste discharges. The Commission will not assign this classification to waters, the bacterial quality of which is dependent upon adequate disinfection of waste and where the interruption of such treatment would render the water unsafe for bathing.

If a waterbody is not classified with "Swimming" as the "best use," it still has applicable bacteria water quality objectives. These vary depending on the best use classification. For the period from June through September, the objectives are generally similar to the objectives established for "Swimming"; however, for the remainder of the year less stringent objectives may apply. For example, the bacteria objectives applicable to waters classified with Fish and Wildlife as the best use are as follows:

(i) In non-coastal waters, bacteria of the fecal coliform group shall not exceed a geometric mean of 1,000 cfu/100 mL; nor exceed a maximum of 2,000 cfu/100 mL in any sample. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours.

(ii) For incidental water contact and recreation during June through September, the bacterial quality of water is acceptable when a sanitary survey by the controlling health authorities reveals no source of dangerous pollution and when the geometric mean fecal coliform organism density does not exceed 200 cfu/100 mL in non-coastal waters. The geometric mean shall be calculated from no less than five samples collected at a given station over a 30-day period at intervals not less than 24 hours. When the geometric bacterial coliform organism density exceeds these levels, the bacterial water quality shall be considered acceptable only if a second detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters. Waters in the immediate vicinity of discharges of sewage or other wastes likely to contain bacteria harmful to humans, regardless of the degree of treatment afforded these wastes, are not acceptable for swimming or other whole body water-contact sports.

Florida

Recreational Use Categories

No specific recreational use definitions found in state water quality standards. Instead, waters are designated by class and the bacteria water quality objectives are established for each class. Florida designates all waters as Class III - Recreation, Propagation, and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife, unless the waters are "secondary and tertiary canals wholly within agricultural areas."

Numeric Objectives

Class III freshwaters have the following applicable water quality objectives:

- Fecal coliform (MPN) shall not exceed a monthly geometric mean (10 sample minimum over a 30-day period) of 200, nor exceed 400 in 10 percent of the samples, not exceed 800 on any one day.
- Total coliform ≤ 1,000 as a monthly geometric mean (10 sample minimum over a 30-day period); not exceed 1,000 in more than 20 percent of the samples examined during any month; ≤ 2,400 at any time.

Georgia

Recreational Use Categories

General Recreational Use classification is applicable to all surface waters. Recreation generally defined as activities such as water skiing, boating, and swimming, or for any other use requiring water of a lower quality, such as recreational fishing.

Numeric Objectives

For the months of May through October, when water contact recreation activities are expected to occur, fecal coliform not to exceed a geometric mean of 200 cfu/100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours. Should water quality and sanitary studies show fecal coliform levels from nonhuman sources exceed 200 cfu/100 ml (geometric mean) occasionally, then the allowable geometric mean fecal coliform shall not exceed 300 per 100 ml in lakes and reservoirs and 500 per 100 ml in free flowing freshwater streams.

For the months of November through April, fecal coliform not to exceed a geometric mean of 1,000 per 100 mL based on at least four samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours and not to exceed a maximum of 4,000 per 100 mL for any sample.

Objectives section includes following statement: The state does not encourage swimming in surface waters since a number of factors which are beyond the control of any State regulatory agency contribute to elevated levels of fecal coliform.

At the request of the Task Force, to better understand how Georgia implements the "nonhuman source" provision of its bacteria water quality objectives, David Word of the Georgia Environmental Protection Division was contacted. He indicated that the provision has never been officially adopted even though it is in the water quality standards regulations. It appears that he meant that the provision has not been approved by EPA. Regardless, Mr. Word indicated that Georgia will likely remove the "nonhuman source" language from the standards next year – at the same time that the state moves forward with a proposal to replace fecal coliform objectives with *E. coli* objectives.

Kentucky

Recreational Use Categories

Primary and Secondary Contact Recreation uses established, but they appear to apply to all surface waters. No specific definition for either was found. Both uses appear to be applicable to all surface waters.

Numeric Objectives

- Primary Contact Recreation – The following objectives shall apply to waters designated as primary contact recreation use:
  - Fecal coliform or *E. coli* shall not exceed 200 cfu/100 mL or 130 cfu/100 mL, respectively, as a geometric mean based on not less than five samples taken during a 30-day period.
  - Concentration also shall not exceed 400 cfu/100 mL in 20 percent or more of all samples taken during a 30-day period for fecal coliform or 240 cfu/100 mL for *E. coli*. These limits shall be applicable during the recreation season of May 1 through October 31. Fecal coliform objectives for Secondary Contact Recreation shall apply during the remainder of the year.
- Secondary Contact Recreation – These objectives apply year-round. Fecal coliform shall not exceed 1,000 cfu/100 mL as a 30-day geometric mean based on not less than five samples; not exceed 2,000 cfu/100 mL in 20 percent or more of all samples taken during a 30-day period.

Mississippi

Recreational Use Categories

Recreation is defined as water suitable for recreational purposes, including such water contact activities as swimming and water skiing. It is not clear how waterbodies are classified. Some are not classified for Recreation, but still may have recreation-related bacteria objectives applied because of their applicability to other classifications, e.g., Fish and Wildlife, Public Water Supply, and Ephemeral. Some of the bacteria objectives refer to an "incidental recreational contact," but this "classification" does not appear to be formally recognized.

Numeric Objectives

Bacteria objectives for freshwater-related classifications other than Recreation are provided below because it appears that the state uses recreational use objectives to protect recreational potential regardless of the classification:

- Recreation – Fecal coliform shall not exceed a geometric mean of 200 cfu/100 mL based on a minimum of five samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 400 cfu/100 mL more than 10 percent of the time.
- Public Water Supply – For the months of May through October, when water contact recreation activities may be expected to occur, fecal coliform shall not exceed a geometric mean of 200 cfu/100 mL based on a minimum of five samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 400 cfu/100 mL more than 10 percent of the time.

  For the months of November through April, when incidental recreational contact is not likely, fecal coliform shall not exceed 2,000 cfu/100 mL as a geometric mean based on at least five samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 4,000 cfu/100 mL more than 10 percent of the time.

- Fish and Wildlife – For the months of May through October, when water contact recreation activities may be expected to occur, fecal coliform shall not exceed a geometric mean of 200 cfu/100 mL based on a minimum of five samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 400 cfu/100 mL more than 10 percent of the time.

  For the months of November through April, when incidental recreational contact is not likely, fecal coliform shall not exceed a geometric mean of 2,000 cfu/100 mL based on a minimum of five samples taken over a 30-day period with no less than 12 hours between individual samples, nor shall the samples examined during a 30-day period exceed 4,000 cfu/100 mL more than 10 percent of the time.

- Ephemeral – Bacteria objectives are assigned where the "probability of a public health hazard or other circumstances so warrant."

North Carolina

Recreational Use Categories

- Primary Recreation – includes swimming, skin diving, skiing, and similar uses involving body contact with water where such activities take place in an organized or on a frequent basis.
- Secondary Recreation – includes wading, boating, other uses not involving body contact with water and activities involving human body contact with water where such activities take place on an infrequent, unorganized, or incidental basis

Numeric Objectives

Waters are classified as according to there best use. Bacteria objectives depend on the waterbodies assigned.

- Class B – Fecal coliform shall not to exceed geometric mean of 200 cfu/100 mL based on at least five consecutive samples examined during any 30-day period and not to exceed 400 cfu/100 mL in more than 20 percent of the samples examined during such period.
- Class C – Fecal coliform shall not exceed a geometric mean of 200 cfu/100 mL based upon at least five consecutive samples examined during any 30-day period, nor exceed 400 cfu/100 mL in more than 20 percent of the samples examined during such a period; violations of the fecal coliform standard are expected during rainfall events and, in some cases, this violation is expected to be caused by uncontrollable nonpoint source pollution.

South Carolina

Recreational Use Categories

Primary Contact Recreation – means any activity with the intended purpose of direct water contact by the human body to the point of complete submergence, including but not limited to swimming, water skiing, and skin diving.

Secondary Contact Recreation – means any activity occurring on or near the water that does not have an intended purpose of direct water contact by the human body to the point of complete submergence, including but not limited to fishing, boating, canoeing, and wading.

Numeric Objectives

No distinction in the objectives between primary and secondary contact. If a waterbody is classified as "Freshwater," both primary and secondary contact recreational uses apply. The bacteria objectives for this use are as follows:

- Fecal coliform – Not to exceed a geometric mean of 200 cfu/100 mL, based on five consecutive samples during any 30-day period; nor shall more than 10 percent of the total samples during any 30-day period exceed 400 cfu/100mL.

Tennessee

Recreational Use Categories

A General Recreational Use appears to be applicable to all surface waters. No definition was found.

Numeric Objectives

The concentration of the *E. coli* group shall not exceed 126 cfu/100 mL, as a geometric mean based on a minimum of five samples collected from a given sampling site over a period of not more than 30 consecutive days with individual samples being collected at intervals of not less than 12 hours. For the purposes of determining the geometric mean, individual samples having an *E. coli* concentration of less than 1 per 100 mL shall be considered as having a concentration of 1 per 100 mL.

Additionally, the concentration of the *E. coli* group in any individual sample taken from a lake, reservoir, State Scenic River, or Tier II or III stream shall not exceed 487 cfu/100 mL. The concentration of the *E. coli* group in any individual sample taken from any other waterbody shall not exceed 941 cfu/100 mL.

EPA Region 5

Illinois

Recreational Use Categories

Illinois waters may be classified as Primary Contact (e.g., swimming, water skiing) or Secondary Contact (e.g., boating, fishing).

Numeric Objectives

From May through October, based on a minimum of five samples taken over not more than a 30-day period, fecal coliform shall not exceed a geometric mean of 200 cfu/100 mL, nor shall more than 10 percent of the samples during any 30-day period exceed 400 cfu/100 mL in protected waters. Protected waters are defined as waters that, due to natural characteristics, aesthetic value, or environmental significance are deserving of protection from pathogenic organisms. Protected waters will meet one or both of the following conditions:

- Presently support or have the physical characteristics to support primary contact
- Flow through or adjacent to parks or residential areas

Waters unsuited to support primary contact uses because of physical, hydrologic, or geographic configuration and are located in areas unlikely to be frequented by the public on a routine basis as determined by the Agency are exempt from this standard.

At the direction of the Task Force, the Illinois Environmental Protection Agency (IEPA) was contacted to better understand the approach used by the agency to determine whether a

waterbody was unsuited for primary contact and met the criteria for exemption. IEPA indicated the following:

- All proposed exemptions are public noticed and recreational "use testimonies" are requested
- Recreational uses are assumed to not occur during wet weather events due to the safety risk
- Exemption regularly applied to waters receiving wastewater discharges that sought disinfection exemptions
- Criteria used by the agency to evaluate potential for exemption include:
  - Waterbody must have 2 feet or less average depth
  - Informal/anecdotal recreational use survey conducted to evaluate "unlikely to be used routinely" criterion in exemption language; however, no formal definition for terms such as "routinely" have been adopted
  - Waterbody must not flow through or be adjacent to a park or residential area
  - Waterbody must not be a public water supply

Indiana

Recreational Use Categories

- Full Body Contact - direct contact with the water to the point of complete submergence

Numeric Objectives

The objectives in this subsection are to be used to evaluate waters for full body contact recreational uses, to establish wastewater treatment requirements, and to establish effluent limits during the recreational season, which is defined as the months of April through October, inclusive:

- *E. coli* bacteria shall not exceed:
  - 125 cfu/100 mL as a geometric mean based on not less than five samples equally spaced over a 30-day period.
  - 235 cfu/100 mL in any one sample in a 30-day period. If a geometric mean cannot be calculated because five equally spaced samples are not available, then the single sample objective must be met.

Michigan

Recreational Use Categories

Michigan recognizes two recreational use subcategories:

- Total Body Contact Recreation – any activities normally involving direct contact with water to the point of complete submergence, particularly immersion of the head, with considerable risk of ingesting water, including swimming.
- Partial Body Contact Recreation – any activities normally involving direct contact of some part of the body with water, but not normally involving immersion of the head or ingesting water, including fishing, wading, hunting, and dry boating.

At a minimum, all surface waters of the state are designated to be protected for the following uses: (a) agriculture; (b) navigation; (c) industrial water supply; (d) public water supply at the point of water intake; (e) warmwater fishery; (f) other indigenous aquatic life and wildlife; and (g) partial body contact recreation. In addition, all surface waters of the state are protected for Total Body Contact Recreation from May 1 to October 31. However, "Total Body Contact Recreation immediately downstream of wastewater discharges, areas of significant urban runoff, combined sewer overflows, and areas influenced by certain agricultural practices is contrary to prudent public health and safety practices, even though water quality standards may be met."

Numeric Objectives
The following objectives, which take into account season, are applicable:

(1) All waters of the state protected for total body contact recreation shall not contain more than 130 *E. coli*/100 mL, as a 30-day geometric mean. Compliance shall be based on the geometric mean of all individual samples taken during five or more sampling events representatively spread over a 30-day period. Each sampling event shall consist of three or more samples taken at representative locations within a defined sampling area. At no time shall the waters of the state protected for total body contact recreation contain more than a maximum of 300 *E. coli*/ 100 mL. Compliance shall be based on the geometric mean of three or more samples taken during the same sampling event at representative locations within a defined sampling area.

(2) All waters of the state protected for partial body contact recreation shall not contain more than a maximum of 1,000 *E. coli*/100 mL. Compliance shall be based on the geometric mean of three or more samples, taken during the same sampling event, at representative locations within a defined sampling area.

(3) Discharges containing treated or untreated human sewage shall not contain more than 200 fecal coliform/100 mL, based on the geometric mean of all of five or more samples taken over a 30-day period, nor more than 400 fecal coliform/100 mL, based on the geometric mean of all of three or more samples taken during any period of discharge not to exceed 7 days. Other indicators of adequate disinfection may be utilized where approved by the department.

(4) The department may suspend the provisions of subrule (3) of this rule, for the purpose of discharge permit issuance, from November 1 to April 30, upon an adequate demonstration by the applicant that designated uses will be protected. At a minimum, the provisions of subrule (2) of this rule shall be met.

Minnesota

Recreational Use Categories

Minnesota has a class system for its waters. Two of these classes include protections for recreation. Class 2 waters are protected for drinking water, aquatic life, and primary contact recreation. Class 7 waters or Limited Resource Value Waters are protected for secondary contact recreation. Five Class 2 subcategories have been established. Within these five Class 2 subcategories, three recreational subcategories have been established:

- 2A (coldwater), Bd (cool/warmwater; waterbody is a drinking water source), B (cool/warmwater; waterbody is not a drinking water source) – class varies depending on type of aquatic life. All of these classes are suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable.
- 2C – suitable for boating and other forms of aquatic recreation for which the waters may be usable.
- 2D – suitable for boating and other forms of aquatic recreation for which the wetland may be usable.

Numeric Objectives

Class 2 Waters – Current bacteria water quality objectives are as follows:

- 2A – Not to exceed 200 cfu/100 mL as a geometric mean of not less than five samples in any calendar month, nor shall more than 10 percent of all samples taken during any calendar month individually exceed 400 cfu/100 mL. The standard applies only between April 1 and October 31.
- 2Bd, 2B, 2C, 2D – Not to exceed 200 cfu/100 mL as a geometric mean of not less than five samples in any calendar month, nor shall more than 10 percent of all samples taken during any calendar month individually exceed 2,000 cfu/100 mL. The standard applies only between April 1 and October 31.

Class 7 Waters - Not to exceed 1,000 cfu/100 mL in any calendar month as determined by a geometric mean of a minimum of five samples, nor shall more than 10 percent of all samples taken during any calendar month individually exceed 2,000 cfu/100 mL. The standard applies only between May 1 and October 31.

Proposed Revision: Minnesota is currently proposing revisions to its water quality objectives for bacteria. The following text has been included verbatim to summarize the proposed objectives and the basis for the changes:

> "The MPCA [Minnesota Pollution Control Agency] is proposing to replace the current fecal coliform standard with an *E. coli* standard, based on an EPA criterion. MPCA's goal is to adopt the *E. coli* standard with as little disruption as possible to ongoing programs, specifically to:
>
> 1. Keep the protection level for swimmers the same.
> 2. Keep the number of waters considered impaired for swimming about the same.
> 3. Retain current assessment methods for determination of impairment.
> 4. Minimize impact on ongoing bacteriological total maximum daily load studies.
> 5. Not impact the BEACH program on Lake Superior beaches.
>
> "The MPCA is recommending the *E. coli* standards shown in the table below. The current fecal coliform standard is included for comparison."

Proposed *E. coli* Standards Shown with the Current Fecal Coliform Standard for Class 2 and Class 7 Waters

Use	Water Type	30-Day Geometric Mean cfu/100 mL		10% of Values not to Exceed cfu/100 mL	
		E. coli	**Fecal coliform**	***E. coli***	**Fecal coliform**
Primary Body Contact (swimming)	Class 2A Trout waters	126*	200	1260	400
	Class 2B, C, D Warm waters	126	200	1260	2000
Secondary Body Contact (wading)	Class 7 Limited Resource Value Waters	630	1000	1260	2000

*126 *E. coli* cfu/100 mL is the 30-day geometric mean EPA criterion (1986).

> "In order to understand the relationship between fecal coliform and *E. coli* levels, for several years the MPCA analyzed for both indicators from the same sample as part of the MPCA routine river and stream monitoring program. The analysis of these paired fecal coliform and *E. coli* measurements suggests that the recommended *E. coli* 30-day geometric mean standard may be slightly more stringent than the current fecal coliform standard. However, because of the variability in bacteriological data, the analysis does not support proposing a geometric mean standard different from the EPA criterion of 126 colony forming units (cfu) per 100 mL.

"EPA allows some flexibility to states to determine the appropriate maximum standard. The MPCA is proposing a maximum standard of 1,260 cfu/100 mL. Again, the analysis of the paired fecal coliform/*E. coli* data indicates this value may be slightly more stringent than the current maximum fecal coliform standard of 2,000 cfu/100 mL, but well within the variability of the data.

"The MPCA is proposing to do away with the more stringent 10 percent maximum standard currently applicable to trout waters (400 cfu/100 mL), and make the maximum standard the same for all waters (see table above). The MPCA believes that the more stringent standard for trout waters is not needed, and that swimmers in any category of Class 2 waters should receive the same level of protection.

"The bacteriological standard applicable to limited resource value (Class 7) waters is designed to protect types of water recreation where emersion in the water is unlikely, such as wading and boating. The MPCA proposes to replace the current Class 7 standard with an *E. coli* standard that provides the same level of protection (see table above).

"It is important to emphasize that the standards proposed for change are the ambient standards applicable to lakes, rivers, and streams in Minnesota. The current fecal coliform effluent limit of 200 fecal coliform cfu/100 mL as a monthly mean that appears in discharge permits is not proposed for change (Minn. R. 7050.0211)."

Ohio

Recreational Use Categories

These use designations are in effect only during the recreation season, which is the period from May 1 to October 15, for all water bodies except those designated seasonal salmonid habitat. The recreation season for streams designated seasonal salmonid habitat is June 1to September 30:

- Bathing Waters – these are waters that, during the recreation season, are suitable for swimming where a lifeguard and/or bathhouse facilities are present, and include any additional such areas where the water quality is approved by the director. Water bodies assigned the bathing waters use designation are not necessarily indicated in rules 3745-1-08 to 3745-1-30 of the Administrative Code but include local areas of those water bodies meeting this definition.
- Primary Contact – these are waters that, during the recreation season, are suitable for full-body contact recreation such as, but not limited to, swimming, canoeing, and scuba diving with minimal threat to public health as a result of water quality. In addition to those water body segments designated in rules 3745-1-08 to 3745-1-32 of the Administrative Code, all

lakes and reservoirs, except upground storage reservoirs and those lakes and reservoirs meeting the definition of bathing waters, are designated primary contact recreation.

- Secondary Contact – these are waters that, during the recreation season, are suitable for partial body contact recreation such as, but not limited to, wading with minimal threat to public health as a result of water quality.

Numeric Objectives

- Bathing Waters
  - Fecal coliform – geometric mean fecal coliform content, based on not less than five samples within a 30-day period, shall not exceed 200 cfu/100 mL and fecal coliform content shall not exceed 400 cfu/100 mL in more than 10 percent of the samples taken during any 30-day period.
  - *E. coli* – geometric mean *E. coli* content, based on not less than five samples within a 30-day period, shall not exceed 126 cfu/100 mL and *E. coli* content shall not exceed 235 cfu/100 mL in more than 10 percent of the samples taken during any 30-day period.
- Primary Contact
  - Fecal coliform – geometric mean fecal coliform content, based on not less than five samples within a 30-day period, shall not exceed 1,000 cfu/100 mL and fecal coliform content shall not exceed 2,000 cfu/100 mL in more than 10 percent of the samples taken during any 30-day period.
  - *E. coli* - geometric mean *E. coli* content, based on not less than five samples within a 30-day period, shall not exceed 126 cfu/100 mL and *E. coli* content shall not exceed 298 cfu/100 mL in more than 10 percent of the samples taken during any 30-day period.
- Secondary Contact
  - Fecal coliform – shall not exceed 5,000 cfu/100 mL in more than 10 percent of the samples taken during any 30-day period.
  - *E. coli* - shall not exceed 576 cfu/100 mL in more than 10 percent of the samples taken during any 30-day period.

Per the direction of the Task Force, Bob Heitzman of the Ohio Environmental Protection Agency was asked if the state was transitioning from fecal coliform to *E. coli* as the pathogen indicator or did the state plan to use both indicators for the long term. Mr. Heitzman responded:

> "When Ohio was considering adopting USEPA's recommended *E. coli* criteria several years ago, people raised concerns about possible increased costs to meet the criteria and about the analytical methods to measure *E. coli*. We, therefore, kept the fecal coliform criteria on the books while those concerns were addressed. We plan to

propose rule revisions in summer 2006, eliminating the fecal coliform criteria and, perhaps, revising the *E. coli* criteria we currently have."

Wisconsin

Wisconsin does not appear to have an explicit class or use system. A separate section in the state's water quality standards addresses recreational use protection:

Standards for Recreational Use – A sanitary survey and/or evaluation to assure protection from fecal contamination is the chief criterion in determining the suitability of a surface water for recreational use.

(a) Bacteriological guidelines – The membrane filter fecal coliform count may not exceed 200 cfu/100 mL as a geometric mean based on not less than five samples per month, nor exceed 400 cfu/100 mL in more than 10 percent of all samples during any month.

(b) Exceptions – Whenever the department determines, in accordance with the procedures specified in s. NR 210.06, that wastewater disinfection is not required to protect recreational uses, the recreational use criteria and classifications as established in this subsection and in chapters NR 103 and 104 do not apply.

Although this section applies to all waters, a review of the use designation portion of the state's standards found that a substantial variance has been established in the "Southeast District" of Wisconsin, which includes the most urbanized portion of the state. This variance states:

(a) The following surface waters in the southeast district shall meet the standards for fish and aquatic life except that the dissolved oxygen shall not be lowered to less than 2 mg/L at any time, nor shall the membrane filter fecal coliform count exceed 1,000 cfu/100 mL as a monthly geometric mean based on not less than five samples per month nor exceed 2,000 cfu/100 mL in more than 10 percent of all samples during any month:

1. Underwood Creek in Milwaukee and Waukesha counties below Juneau Boulevard
2. Barnes Creek in Kenosha County
3. Pike Creek, a tributary of Pike River, in Kenosha County
4. Pike River in Racine County
5. Indian Creek in Milwaukee County
6. Honey Creek in Milwaukee County

7. Menomonee River in Milwaukee County below the confluence with Honey Creek

8. Kinnickinnic River in Milwaukee County

9. Lincoln Creek in Milwaukee County

(b) The following surface waters in the southeast district shall meet the standards for fish and aquatic life except that the dissolved oxygen may not be lowered to less than 2 mg/L at any time, nor may the membrane filter fecal coliform count exceed 1,000 cfu/100 mL as a monthly geometric mean based on not less than five samples per month nor exceed 89 degrees F at any time at the edge of the mixing zones established by the department under s. NR 102.05 (3):

1. Milwaukee River in Milwaukee County downstream from the North Avenue dam

2. South Menomonee Canal and Burnham Canal in Milwaukee County

EPA Region 6

Arkansas

Recreational Use Categories

- Primary Contact Recreation – This beneficial use designates waters where full body contact is involved. Any streams with watersheds of greater than 10 mi^2 are designated for full body contact. All streams with watersheds less than 10 mi^2 may be designated for primary contact recreation after site verification.
- Secondary Contact Recreation – This beneficial use designates waters where secondary activities like boating, fishing, or wading are involved.

Numeric Objectives

- Primary Contact Waters – Between May 1 and September 30, fecal coliform shall not exceed a geometric mean of 200 cfu/100 mL, nor a monthly maximum of 400 cfu/100 mL. Alternatively, in these waters, *E. coli* colony counts shall not exceed a geometric mean of more than 126 cfu/100 mL, or a monthly maximum value of not more than 298 cfu/100 mL in lakes, reservoirs, and Extraordinary Resource Waters or 410 cfu/100 mL in other rivers and streams. During the remainder of the calendar year, these objectives may be exceeded, but at no time shall these counts exceed the level necessary to support secondary contact recreation.
- Secondary Contact Waters – Fecal coliform shall not exceed a geometric mean of 1,000 cfu/100 mL, nor a monthly maximum of 2,000 cfu/100 mL. *E. coli* values shall not exceed the geometric mean of 630 cfu/100 mL or a monthly maximum of 1,490 cfu/100 mL for lakes, reservoirs, and Extraordinary Resource Waters and 2,050 cfu/100 mL for other rivers and streams.

For assessment of ambient waters as impaired by bacteria, the above listed applicable values shall not be exceeded in more than 25 percent of samples in no less than eight samples taken during the primary contact season or during the secondary contact season.

Louisiana

Recreational Use Categories

- Primary Contact Recreation – any recreational or other water contact use involving prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable. Examples of this type of water use include swimming, skiing, and diving.
- Secondary Contact Recreation – any recreational or other water contact use in which body contact with the water is either incidental or accidental and the probability of ingesting appreciable amounts of water is minimal. Examples of this type of water use include fishing, wading, and boating.

Numeric Objectives

- Primary Contact Recreation – No more than 25 percent of the total samples collected on a monthly or near monthly basis shall exceed a fecal coliform density of 400 cfu/100 mL. This primary contact recreation criterion shall apply only during the defined recreational period of May 1 through October 31. During the non-recreational period of November 1 through April 30, the objectives for secondary contact recreation shall apply.
- Secondary Contact Recreation – No more than 25 percent of the total samples collected on a monthly or near monthly basis shall exceed a fecal coliform density of 2,000 cfu/100 mL. This secondary contact recreation criterion shall apply year round.

New Mexico

Recreational Use Categories

- Primary Contact Recreation – means any recreational or other water use in which there is prolonged and intimate human contact with the water, such as swimming and water skiing, involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard. Primary contact also means any use of surface waters of the state for cultural, religious, or ceremonial purposes in which there is intimate human contact with the water, including but not limited to ingestion or immersion that could pose a significant health hazard.
- Secondary Contact Recreation – any recreational or other water use in which human contact with the water may occur and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, wading, commercial, and recreational boating and any limited seasonal contact.

Numeric Objectives
Numeric bacteria objectives are listed by basin or waterbody type. Objectives are typically one of the following combinations with the more stringent objectives associated with primary contact and the less stringent objectives associated with secondary contact:

- The monthly geometric mean of *E. coli* bacteria 126 cfu/100 mL or less; single sample 235 cfu/100 mL or less
- The monthly geometric mean of *E. coli* bacteria 548 cfu/100 mL or less, single sample 2,507 cfu/100 mL or less (some waters have a single sample objective of 2,880 cfu/100 mL)

Note: The above objectives are generally the rule. However, variations exist where a waterbody designated secondary contact has more stringent objectives. Some waters also have different single sample limits.

Per the state's 2003 rule proposal, the basis for the New Mexico secondary contact geometric mean objective of 548 cfu/100 mL is the use of an accepted illness rate of 14/1,000. The single sample objective of 2,507 cfu/100 mL is based on the 95 percent confidence level of infrequently used waters. No explanation is provided for the higher objective of 2,880 cfu/ 100 mL.

Oklahoma

Recreational Use Categories

- Primary Body Contact Recreation involves direct body contact with the water where a possibility of ingestion exists. In these cases the water shall not contain chemical, physical, or biological substances in concentrations that are irritating to skin or sense organs or are toxic or cause illness upon ingestion by human beings.
- Secondary Body Contact Recreation – A UAA is required to designate a water with Secondary Body Contact Recreation. The Secondary Body Contact Recreation beneficial use is designated where ingestion of water is not anticipated; associated activities may include boating, fishing or wading.

Numeric Objectives
Objectives for Primary Contact Recreation apply only during the recreation period of May 1 to September 30. The objectives for Secondary Body Contact Recreation apply during the remainder of the year.

- Primary Contact Recreation – Compliance shall be based upon meeting the requirements of one of the three options specified below for bacteria. Upon selection of one group or test method, said method shall be used exclusively over that 30-day period. Provided, where concurrent data exist for multiple bacterial indicators on the same waterbody or waterbody segment, no objectives exceedances shall be allowed for any indicator group:

- Fecal coliform shall not exceed a monthly geometric mean of 200 cfu/100 mL, as determined by multiple-tube fermentation or membrane filter procedures based on a minimum of not less than five samples collected over a period of not more than 30 days. Further, in no more than 10 percent of the total samples during any 30-day period shall fecal coliform exceed 400 cfu/100 mL.
- *E. coli* shall not exceed a monthly geometric mean of 126 cfu/100 mL based upon a minimum of not less than five samples collected over a period of not more than 30 days. No sample shall exceed a 75 percent one-sided confidence level of 235 cfu/100 mL in lakes and high use waterbodies and the 90 percent one-sided confidence level of 406 cfu/100 mL in all other Primary Body Contact Recreation beneficial use areas.
- *Enterococci* shall not exceed a monthly geometric mean of 33 cfu/100 mL based upon a minimum of not less than five samples collected over a period of not more than 30 days. No sample shall exceed a 75 percent one-sided confidence level of 61 cfu/100 mL in lakes and high use waterbodies and the 90 percent one-sided confidence level of 108 cfu/100 mL in all other Primary Body Contact Recreation beneficial use areas.

- Secondary Contact Recreation – Waters so designated shall be maintained to be free from human pathogens in numbers that may produce adverse health effects in humans. The water quality requirements for Secondary Body Contact Recreation are usually not as stringent as for Primary Body Contact Recreation

Texas

Recreational Use Categories

- Contact Recreation – Recreational activities involving a significant risk of ingestion of water, including wading by children, swimming, water skiing, diving, and surfing.
- Noncontact Recreation – Aquatic recreational pursuits not involving a significant risk of water ingestion; including fishing, commercial and recreational boating, and limited body contact incidental to shoreline activity.

Texas water quality standards state: Classified segments are designated for contact recreation unless elevated concentrations of indicator bacteria frequently occur due to sources of pollution which cannot be reasonably controlled by existing regulations or contact recreation is considered unsafe for other reasons such as ship or barge traffic. In a classified segment where contact recreation is considered unsafe for reasons unrelated to water quality, a designated use of noncontact recreation may be assigned objectives normally associated with contact recreation. A designation of contact recreation is not a guarantee that the water so designated is completely free of disease-causing organisms. Indicator bacteria, although not generally pathogenic, are indicative of potential contamination by feces of warm blooded animals. The objectives for contact recreation are based on these indicator bacteria, rather than direct measurements of pathogens.

Numeric Objectives

- *E. coli*:
  - Contact Recreation – The geometric mean of *E. coli* should not exceed 126 cfu/100 mL. In addition, single samples of *E. coli* should not exceed 394 cfu/100 mL.
  - Noncontact Recreation – The geometric mean of *E. coli* should not exceed 605 cfu/ 100 mL.
- Fecal coliform – Fecal coliform bacteria can be used as an alternative instream indicator of recreational suitability until sufficient data are available for *E coli* or *Enterococci*. Fecal coliform can also continue to be used as a surrogate indicator in effluent limits for wastewater discharges. Fecal coliform objectives are as follows:
  - Contact Recreation – The geometric mean of fecal coliform should not exceed 200 cfu/ 100 mL. In addition, single samples of fecal coliform should not exceed 400 cfu/100 mL.
  - Noncontact Recreation – Fecal coliform shall not exceed 2,000 cfu/100 mL as a geometric mean. In addition, single samples of fecal coliform should not exceed 4,000 cfu/100 mL.

EPA Region 7

Iowa

Recreational Use Categories

- Primary Contact Recreational Use (Class "A1") – Waters in which recreational or other uses may result in prolonged and direct contact with the water, involving considerable risk of ingesting water in quantities sufficient to pose a health hazard. Such activities would include, but not be limited to, swimming, diving, water skiing, and water contact recreational canoeing.
- Secondary Contact Recreational Use (Class "A2") – Waters in which recreational or other uses may result in contact with the water that is either incidental or accidental. During the recreational use, the probability of ingesting appreciable quantities of water is minimal. Class A2 uses include fishing, commercial and recreational boating, any limited contact incidental to shoreline activities and activities in which users do not swim or float in the water body while on a boating activity.
- Children's Recreational Use (Class "A3") – Waters in which recreational uses by children are common. Class A3 waters are water bodies having definite banks and bed with visible evidence of the flow or occurrence of water. This type of use would primarily occur in urban or residential areas.

Numeric Objectives

The applicable water quality objectives are dependent on the waterbody's classification:

- Class A1, March 15 – November 15 – *E. coli* 126 cfu/100 mL geometric mean; 235 cfu/100 mL single sample maximum; remainder of the year the bacteria objectives do not apply.
- Class A2, March 15 – November 15 – *E. coli* 630 cfu/100 mL geometric mean; 2,880 cfu/100 mL single sample maximum; remainder of the year the bacteria objectives do not apply.
- Class A3, March 15 – November 15 – *E. coli* 126 cfu/100 mL geometric mean; 235 cfu/100 mL single sample maximum; remainder of the year the bacteria objectives do not apply.
- Class A2 and Aquatic Life (cold or warmwater) or a waterbody designated as a "high quality" water – *E. coli* 630 cfu/100 mL geometric mean; 2,880 cfu/100 mL single sample maximum; year-round.

At the request of the Task Force, information was requested from the Iowa Department of Natural Resources regarding how the agency makes a determination that a waterbody is Class A3. Adam Schnieders provided the following information:

- Iowa has no formal protocol for the classification of recreational uses. The state collects data on waters, e.g., depth, flow, bank characteristics, location (e.g., urban, near parks, residential areas), and then uses a general weight of evidence approach for assigning recreational uses.
- Only a few waters are classified as A3 and these are all urban streams in populated areas.
- The state has no plans to establish more stringent bacteria objectives for the Class A3 use.

Kansas

Recreational Use Categories

Kansas has numerous definitions related to the establishment of recreational use subcategories:

- Primary Contact Recreation – Primary contact recreational use is evaluated differently for each of two main categories of waters: 1) classified surface waters other than classified stream segments, and 2) classified stream segments. For each category, the determining factor for primary contact recreation is body immersion in the water to the extent that some inadvertent ingestion of water is probable. The primary contact recreation season is from April 1 through October 31 of each year.
  - Classified Surface Waters Other Than Classified Stream Segments – Uses supported in this category include boating, mussel harvesting, swimming, skin diving, water skiing, and wind surfing. The three subcategories of primary contact recreational use for classified surface waters other than classified streams segments are:

    - Primary Contact Recreational Use: Swimming Beach - applies to those classified surface waters other than classified stream segments that have posted public swimming areas. During the non-recreational season, the secondary contact recreational use: public access objectives will apply.
    - Primary Contact Recreational Use: Public Access – applies to those classified surface waters other than classified stream segments where full body contact may occur and is by law or written permission of the landowner open to and accessible by the public. During the non-recreational season, the secondary contact recreational use: public access objectives will apply.
    - Primary Contact Recreational Use: Restricted Access - applies to those classified surface waters other than classified stream segments where full body contact may occur and is not open to and accessible by the public under Kansas law. During the non-recreational season, the secondary contact recreational use: restricted access objectives will apply.
  - Classified Stream Segments – The three subcategories of primary contact recreational use for classified stream segments are:
    - Primary Contact Recreational Use: Class A – applies to those classified stream segments that have been designated as public swimming areas. Uses supported in this category include activities such as; kayaking, mussel harvesting, swimming, skin diving, water skiing, and wind surfing. During the non-recreational season, the secondary contact recreational use Class A objectives will apply.
    - Primary Contact Recreational Use: Class B – applies to classified stream segments where moderate full body contact from activities that include kayaking, mussel harvesting, swimming, skin diving, water skiing, and wind surfing shall occur. A classified stream segment under this classification must be by law or written permission of the landowner open to and accessible by the public. During the non-recreational season, the secondary contact recreational use Class A objectives will apply.
    - Primary Contact Recreational Use: Class C – applies to classified stream segments supporting boating, mussel harvesting, swimming, skin diving, water skiing, wind surfing, wading, or fishing and has infrequent full body contact under Kansas' law, a classified stream segment in this classification is not open to and accessible by the public. During the non-recreational season, the secondary contact recreational use Class B objectives will apply.
- Secondary Contact Recreational Use – There are two categories for secondary contact recreational use: 1) classified surface waters other than classified stream segments and 2) classified stream segments. The determining factor for secondary contact recreational use is a lack of body immersion to the extent ingestion of surface water is not probable. The

secondary contact recreational use standards apply year round to surface waters designated for secondary contact recreational use.

- Classified Surface Waters Other Than Classified Stream Segments – This use shall include wading, fishing, trapping, and hunting. The two subcategories of secondary contact recreational use for classified surface waters other than classified streams segments are:
  - Secondary Contact Recreational Use: Public Access – applies to classified surface waters other than classified stream segments that are by law or written permission of the landowner open to and accessible by the public.
  - Secondary Contact Recreational Use: Restricted Access – applies to classified surface waters other than a classified stream segments that by law are not open to and accessible by the public.
- Classified Stream Segments – Secondary contact recreational uses for classified stream segments are capable of supporting the recreational activities of wading, fishing, canoeing, motor boating, rafting, or other types of boating. There two classes of secondary contact recreational use for classified stream segments are:
  - Secondary Contact Recreational Use: Class A – applies to classified stream segments that are by law or written permission of the landowner open to and accessible by the public.
  - Secondary Contact Recreational Use: Class B – applies to classified stream segments that by law are not open to and accessible by the public.

If opposite sides of a classified stream segment have differing public access status, the designated use of the entire classified stream segment will be the assigned the highest attainable recreational use. Assignment of the higher use, however, does not grant de facto public access to both sides of such segment.

Neither primary nor secondary contact recreational use designations will apply to stream segments where the natural, ephemeral, intermittent, or low flow conditions or water levels prevent primary or secondary recreational activities.

Numeric Objectives

Kansas has established the following *E. coli* for classified stream segment:

Use	Colony Forming Units (cfu)/100mL	
Primary Contact Recreation	**Geometric Mean April 1 - Oct. 31**	**Geometric Mean Nov. 1 - March 31**
Class A	160	2,358
Class B	262	2,358
Class C	427	3,843
Secondary Contact Recreation	**Geometric Mean Jan. 1 - Dec. 31**	
Class A	2,358	
Class B	3,843	

Kansas has also adopted *E. coli* objectives specific to classified surface waters other than stream segments, e.g., lakes, reservoirs, wetlands, ponds, etc.:

Use	Colony Forming Units (cfu)/100 mL			
Primary Contact Recreation	**Geometric Mean Apr 1 - Oct 31**	**Geometric Mean Nov 1 - Mar 31**	**Single Sample Maximum Apr 1 - Oct 31**	**Single Sample Maximum Nov 1 - Mar 31**
Swimming Beach	160	800	732	3,655
Public Access	262	1,310	1,198	6,580
Restricted Access	427	2,135	1,950	9,760
Secondary Contact Recreation	**Geometric Mean Jan 1 - Dec 31**		**Single Sample Maximum Jan 1 - Dec 31**	
Public Access	2,135		9,760	
Restricted Access	2,135		9,760	

High Flow Exemption – Kansas has a high flow exemption for *E. coli* objectives if any of the following conditions are met:

- The flow is equal to or greater than the flow that is exceeded 10 percent of the time for any classified stream segment with a mean flow of less than 30 cubic feet per second.
- The flow is equal to or greater than 50 percent of the 2-year flood flow for any classified stream segment that has a mean flow of 30 or more cubic feet per second but less than 900 cubic feet per second.
- The flow is equal to or greater than the 2-year flood flow for any classified stream segment that has a mean flow greater than 900 cubic feet per second.

Because of the uniqueness of Kansas' water quality standards, the state was contacted for more information. The state provided the following:

- Portion of the EPA letter that approved the above recreational subcategorizations and water quality objectives (see Appendix B). EPA notes that Kansas used an appropriate risk management approach, consistent with EPA guidance, for establishing uses and objectives.

- Kansas has established UAA guidance for evaluating recreational uses (www.kdhe.state.ks.us/befs/uaas/UAAGuidance.pdf). As a result of this guidance, Kansas has completed over 1600 recreational UAAs

Missouri

Recreational Use Categories

- Whole-Body Contact Recreation – Activities in which there is direct human contact with the raw surface water to the point of complete body submergence. The raw water may be ingested accidentally and certain sensitive body organs, such as the eyes, ears, and the nose, will be exposed to the water. Although the water may be ingested accidentally, it is not intended to be used as a potable supply unless acceptable treatment is applied. Water so designated is intended to be used for swimming, water skiing, or skin diving.
- Secondary Contact Recreation – Applies where incidental contact occurs and ingestion unlikely

State's water quality standards are currently being updated to recognize where whole-body and secondary contact uses should apply. UAAs have been done where appropriate to demonstrate secondary contact. UAA protocol was developed by the state; it uses simple observations to make decisions regarding whether whole body contact is an existing use. State appears to use the following depth objectives for whole body: depth of at least 1 meter or average of 0.5 meter.

Numeric Objectives

- Protection of whole-body-contact recreation is limited to classified waters designated for that use. For periods when the stream or lake is not affected by stormwater runoff, the fecal coliform count shall not exceed 200 cfu/100 mL during the recreational season in waters designated for whole-body-contact recreation or at any time in losing streams. The recreational season is from April 1 to October 31.
- No objectives have been adopted for waters designated with secondary contact recreation.

Nebraska

Recreational Use Categories

Nebraska has only one recreational use: Primary Contact Recreation. Per the state regulations, this use applies to surface waters which are used, or have a high potential to be used, for primary contact recreational activities. Primary contact recreation includes activities where the body may come into prolonged or intimate contact with the water, such that water may be accidentally ingested and sensitive body organs (e.g., eyes, ears, nose, etc.) may be exposed. Although the water may be accidentally ingested, it is not intended to be used as a potable water supply unless acceptable treatment is applied. These waters may be used for swimming, water skiing, canoeing, and similar activities. Any of the following objectives may be used to determine support of this use.

Numeric Objectives

- Fecal Coliform – Bacteria of the fecal coliform group shall not exceed a geometric mean of 200 cfu/100 mL, nor equal or exceed 400 cfu/100 mL, in more than 10 percent of the samples. These objectives are based on a minimum of five samples taken within a 30-day period. This does not preclude fecal coliform limitations based on effluent guidelines. These objectives apply during the recreational period of May 1 through September 30.
- *E. coli* – *E. coli* bacteria shall not exceed a geometric mean of 126 cfu/100 mL. For increased confidence of the objectives, the geometric mean should be based on a minimum of five samples taken within a 30-day period. This does not preclude fecal coliform limitations based on effluent guidelines. Single sample maximum allowable densities shall not exceed the following objectives:
  - 235 cfu/100 mL at designated bathing beaches
  - 298 cfu/100 mL at moderately used recreational waters
  - 406 cfu/100 mL at lightly use recreational waters
  - 576 cfu/100 mL at infrequently used recreational waters

Note: Appears to be no seasonal basis for *E. coli* objectives.

EPA Region 8

Colorado

Recreational Use Categories

- Class 1, Primary Contact – These surface waters are suitable or intended to become suitable for recreational activities in or on the water when the ingestion of small quantities of water is likely to occur. Such waters include but are not limited to those used for swimming, rafting, kayaking, tubing, windsurfing, and water-skiing. Waters shall be presumed to be suitable for Class 1 uses and shall be assigned a class 1a or class 1b classification unless a UAA demonstrates that there is not a reasonable potential for primary contact uses to occur in the water segment(s) in question within the next 20-year period:
  - Class 1a, Existing Primary Contact – Class 1a waters are those in which primary contact uses have been documented or are presumed to be present. Waters for which no UAA has been performed demonstrating that a recreation class 2 classification is appropriate shall be assigned a class 1a classification, unless a reasonable level of inquiry has failed to identify any existing class 1 uses of the water segment.
  - Class 1b, Potential Primary Contact – This classification shall be assigned to water segments for which no UAA has been performed demonstrating that a recreation class 2 classification is appropriate, if a reasonable level of inquiry has failed to identify any existing class 1 uses of the water segment.

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

Numeric Objectives

- Primary Contact Recreation (Where data from both indicators are available for a site, the *E. coli* indicator takes precedent for assessment purposes):
- *E. coli*
  - Class 1a – 126 cfu/100 mL, geometric mean
  - Class 1b – 205 cfu/100 mL, geometric mean
- Fecal coliform
  - Class 1a – 200 cfu/100 mL, geometric mean
  - Class 1b – 325 cfu/100 mL, geometric mean
- Secondary Contact
  - *E. coli*, 630 cfu/100 mL, geometric mean
  - Fecal coliform, 2,000 cfu/100 mL, geometric mean

Regulations include a statement regarding why no single sample maximum objectives have been adopted:

The Commission has declined to adopt such objectives at this time, due in part to uncertainty regarding the significance of and the appropriate response to elevated single sample test results. An important aspect of this concern is the substantial variability that can be common in individual bacteriological samples, because bacteria are not uniformly distributed in water samples, since they behave more like suspended particles, rather than dissolved constituents. Repeat testing on such samples can yield results which vary substantially.

Montana

Recreational Use Categories

Waters are classified with groupings of uses. Classified waters are either protected for "bathing, swimming, and recreation" or "secondary contact recreation." Only the latter is defined (the other likely being considered self-explanatory): Secondary contact recreation - activities in or on the water where the potential for immersion or ingestion of water is low, such as wading or boating.

Numeric Objectives
Instead of assigning several beneficial uses to a given water body, a single use category is assigned. Each use category is composed of different combinations of beneficial uses. There are a total of approximately 16 categories with the following names: A-Closed, A-1, B-1, B-2, B-3,…, F-1, G-1. For categories from D-1 thru G-1, the applicable use is secondary contact recreation. All other categories are protected for "swimming" type recreation. The following table shows the numeric objectives for bacteria in each of the Montana beneficial use categories.

	Colony Forming Unit (cfu)/100 mL	
Use Category	**Geometric Mean April 1 - Oct 31**	**Geometric Mean Nov 1 - Mar 31**
A-1 through A-Closed	32	32
B-1 through C-2	126	630
C3	252	630
D-1 through G-1	630	630

North Dakota

Waters identified by class with types or groupings of applicable uses. It appears that all waters regardless of class have the following fecal coliform criterion: not to exceed 200 cfu/100 mL in any sample, but only during the "recreation season" from May 1 through September 30. However, a separate rule section requires that any wastewater discharge meet a 200 cfu/100 mL criterion prior to discharge.

South Dakota

Recreational Use Categories

- Immersion Recreation – a beneficial use assigned to surface waters of the state that are suitable for uses where the human body may come in direct contact with the water, to the point of complete submersion and where water may be accidentally ingested or where certain sensitive organs such as the eyes, ears, and nose may be exposed to water
- Limited-Contact Recreation – a beneficial use assigned to surface waters of the state that are suitable for boating, fishing, and other water-related recreation other than immersion recreation where a person's water contact would be limited to the extent that infections of eyes, ears, respiratory or digestive systems, or urogenital areas would normally be avoided

Numeric Objectives

- Immersion Recreation – Applicable only from May 1 to September 30; Fecal coliform ≤200 cfu/100 mL geometric mean based on a minimum of five samples obtained during separate 24-hour periods for any 30-day period, and they may not exceed this value in more than 20 percent of the samples in this same 30-day period. No single sample may exceed 400 cfu/100 mL.

- Limited Contact Recreation – Applicable only from May 1 to September 30; Fecal coliform ≤1,000 cfu/100 mL geometric mean based on a minimum of five samples obtained during separate 24-hour periods for any 30-day period, and they may not exceed this value in more than 20 percent of the samples in this same 30-day period. No single sample may exceed 2,000 cfu/100 mL.

Note: Appears that waters have no objectives from October 1 through April 30; however, this has not been confirmed.

Utah

Recreational Use Categories

Utah categorizes use types (e.g., recreation, aquatic life) into classes. Class 2 and its two subclasses establish protection categories for recreation:

- Class 2 – Protected for recreational use and aesthetics
  - Class 2A – Protected for primary contact recreation such as swimming
  - Class 2B – Protected for secondary contact recreation, e.g., boating, wading, or similar uses

Numeric Objectives

- *E. coli*
  - Class 2A - 126 cfu/100 mL, 30-day geometric mean; 206 cfu/100 mL single sample maximum
  - Class 2B – 576 cfu/100 mL, 30-day geometric mean; 940 cfu/100 mL single sample maximum

At the request of the Task Force, information was requested from the Utah Department of Environmental Quality regarding the basis for the use of the 940 cfu/100 mL single sample maximum objective. No response was received from the state.

Wyoming

Recreational Use Categories

- Primary Contact Recreation – any recreational or other surface water use in which there is contact with the water sufficient to pose a significant health hazard (i.e., water skiing, swimming).
- Secondary Contact Recreation – any recreational or other surface water use in which contact with water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, hunting and commercial and recreational boating.

Numeric Objectives
The following objectives are currently proposed to replace existing fecal coliform objectives:

- Geometric mean objectives:
  - Primary Contact Recreation – In all waters designated for primary contact recreation, during the summer recreation season (May 1 through September 30), concentrations of *E. coli* bacteria shall not exceed a geometric mean of 126 cfu/100 mL based on a minimum of not less than five samples obtained during separate 24 hour periods for any 30-day period. During the period October 1 through April 30, all waters are protected for secondary contact recreation only.
  - Secondary Contact Recreation – In all waters designated for secondary contact recreation, and in waters designated for primary contact recreation during the winter recreation season (October 1 through April 30), concentrations of *E. coli* bacteria shall not exceed a geometric mean of 630 organisms per 100 milliliters based on a minimum of not less than five samples obtained during separate 24 hour periods for any 30-day period.
- Single-Sample Maximum Concentrations – During the recreation season, on all waters designated for primary contact recreation, the following single-sample maximum concentrations of *E. coli* bacteria shall apply:
  - High use swimming areas – 235 organisms per 100 milliliters
  - Moderate full body contact – 298 organisms per 100 milliliters
  - Lightly used full body contact – 410 organisms per 100 milliliters
  - Infrequently used full body contact – 576 organisms per 100 milliliters

Additional information provided regarding use of objectives: Single-sample maximum values may be used to post recreational use advisories in public recreation areas and to derive single-sample maximum effluent limitations on point source discharges. Exceedances of the single-sample maxima shall not be cause for the listing of a waterbody on the State 303(d) list or development of a TMDL or watershed plan. The appropriate recreational use category (i through iv above) shall be determined by the administrator as needed, on a case by case basis. In making such a determination, the administrator may consider such site-specific circumstances as type and frequency of use, time of year, public access, proximity to populated areas and local interests.

EPA Region 9

Arizona

Recreational Use Categories

- Full-Body Contact – use of a surface water for swimming or other recreational activity that causes the human body to come into direct contact with the water to the point of complete

submergence. The use is such that ingestion of the water is likely and sensitive body organs, such as the eyes, ears, or nose, may be exposed to direct contact with the water.

- Partial-Body Contact – use of a surface water that may cause the human body to come into direct contact with the water, but normally not to the point of complete submergence (for example, wading or boating). The use is such that ingestion of the water is not likely and sensitive body organs, such as the eyes, ears, or nose, will not normally be exposed to direct contact with the water.

Numeric Objectives
Both full and partial body contact use objectives are based on *E. coli*:

- Full Body Contact – Geometric mean (four-sample minimum) 126 cfu/100 mL; single sample maximum of 235 cfu/100 mL.
- Partial Body Contact – Geometric mean (four-sample minimum) 126 cfu/100 mL; single sample maximum of 575 cfu/100 mL.

Arizona recently published draft rules as part of its current triennial review of water quality standards. Arizona is proposing to establish separate single sample maximum criteria for designated beaches/swimming areas and other waters with a Full Body Contact use. The revised criteria would be as follows:

- Single sample maximum (designated bathing beaches and swimming areas) – 235 cfu/ 100 mL
- Single sample maximum (all other surface waters designated Full Body Contact) – 575 cfu/ 100 mL)

Arizona does not apply any recreational uses or objectives to waterbodies that are canals. This includes the following canals that have classified uses: "Phoenix Area Canals" and "Yuma Area Canals."

California

Recreational Use Categories
All nine California Regional Water Quality Boards have two recreational uses that are defined as follows:

- REC-1, Water Contact Recreation – waters are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.
- REC-2, Non-contact Water Recreation – waters are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to,

picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

Region 8 (Santa Ana) has added the following footnote to these definitions:

> "The REC1 and REC2 beneficial use designations assigned to surface waterbodies in this Region should not be construed as encouraging recreational activities. In some cases, such as Lake Mathews and certain reaches of the Santa Ana River, access to the waterbodies is prohibited because of potentially hazardous conditions and/or because of the need to protect other uses, such as municipal supply or sensitive wildlife habitat. Where REC1 or REC2 is indicated as a beneficial use in Table 3-1, the designations are intended to indicate that the uses exist or that the water quality of the waterbody could support recreational uses."

Numeric Objectives

The applicable numeric objectives do vary somewhat across regions and the regions are at different stages with addressing EPA's recommendation to change from the traditional fecal coliform objectives to *E. coli* and *Enterococci* objectives. Following is a region-by-region summary of bacteria objectives and, where information was available, the status of efforts to modify these objectives:

<u>Region 1 – North Coast</u>

- REC-1 Objectives – In waters designated for contact recreation (REC-1), the median fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed 50/100 mL, nor shall more than 10 percent of total samples during any 30-day period exceed 400/100 mL.
- REC-2 Objectives – Region 1 has not established any REC-2 bacteria objectives.

Region 1's 2004 triennial review workplan includes the following: Regional Update to the Water Quality Objectives for Bacteria (to include the Russian River) for FY '05-'06 – purpose is to consider adopting *E. coli* and *Enterococci* objectives and add a single sample maximum that "could give guidance for posting areas when the bacteria levels are considered unhealthy for the REC-1 (primary water contact) use."

<u>Region 2 – San Francisco Bay</u>

Basin Plan (Table 3-1) provides the following objectives:

- REC-1 – Fecal coliform geometric mean < 200 cfu/100mL (based on five samples equally spaced over a 30-day period) and 90th percentile < 400 cfu/100 mL; Total coliform median < 240 cfu/100 mL and no sample > 10,000 cfu/100 mL.
- REC-2 - Fecal coliform mean < 2000 cfu/100 mL and 90th percentile < 4000 cfu/100 mL.

Region 2's Basin Plan also includes a table (Table 3-2) that summarizes EPA's water quality criteria for water contact recreation based on the frequency of use a particular area receives. These criteria are identical to the EPA 1986 recommendations (see following table). According to the Basin Plan, "these criteria will be used to differentiate between pollution sources or to supplement objectives for water contact recreation."

TABLE 3-2 U.S. EPA BACTERIOLOGICAL CRITERIA FOR WATER CONTACT RECREATION[1,2] (IN COLONIES PER 100 ML)

	FRESH WATER		SALT WATER
	ENTEROCOCCI	E. COLI	ENTEROCOCCI
Steady State (all areas)	33	126	35
Maximum at:			
- designated beach	61	235	104
- moderately used area	89	298	124
- lightly used area	108	406	276
- infrequently used area	151	576	500

NOTES:
1. The criteria were published in the Federal Register, Vol. 51, No. 45 / Friday, March 7, 1986 / 8012 - 8016. The Criteria are based on:
   (a) Cabelli, V.J. 1983. Health Effects Criteria for Marine Recreational Waters. U.S. EPA, EPA 600/1-80-031, Cincinnati, Ohio, and
   (b) Dufour, A.P. 1984. Health Effects Criteria for Fresh Recreational Waters. U.S. EPA, EPA 600/1-84-004, Cincinnati, Ohio.
2. The U.S. EPA criteria apply to water contact recreation only. The criteria provide for a level of protection based on the frequency of usage of a given water contact recreation area. The criteria may be employed in special studies within this region to differentiate between pollution sources or to supplement the current coliform objectives for water contact recreation.

Region 2's November 2004 staff report prioritizing triennial review issues, rated modification of bacteria water quality objectives as a low priority for the following reasons:

> "In 1986, the Water Board included the then-newly adopted U.S. EPA bacteriological criteria for reference (Table 3-2), but not as water quality objectives. U.S. EPA has requested that the Water Board take the next step of adopting them as State water quality objectives, as has been done in some other Regional Water Board jurisdictions. Table 3-1 contains bacteriological water quality objectives. Some bacteriological criteria are currently cited in Table 3-2 of the Basin Plan as U.S. EPA criteria, not water quality objectives. In their comment letter, U.S. EPA requested that Water Board

adoption of bacteriological criteria as water quality objectives precede U.S. EPA's promulgation of these criteria in the State's coastal waters. U.S. EPA is encouraging all Regional Water Boards to adopt the 1986 criteria as State water quality objectives for their non-coastal waters. This issue is under active discussion at the Basin Plan roundtable as a statewide planning priority, in order to make Regional Water Board planning resources available for other priorities. U.S. EPA noted that such promulgation would only affect coastal waters in our region, and requests that this Water Board adopt the objectives for inland surface waters. Table 3-1 of the Basin Plan already contains bacteriological objectives (fecal coliform) to protect these waters, and our experience has shown that the U.S. EPA objectives are not significantly different from Basin Plan objectives based on analyses from the Section 303d impaired waterbodies listings in 2002. For example, an analysis of compliance with Table 3-1 (objectives) and 3-2 (U.S. EPA criteria) yielded the identical conclusions of percent exceedances and impairment at every beach analyzed in the 2002 303d process, as documented in the administrative record for that action."

Region 3 – Central Coast

- REC-1 – Fecal coliform concentration, based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200 cfu/100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 400 cfu/100 mL.
- REC-2 – Fecal coliform concentration, based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 2,000 cfu/100 mL, nor shall more than 10 percent of samples collected during any 30-day period exceed 4,000 cfu/100 mL.

Revised bacteria water quality objectives were a triennial review priority for 2001-2004, but no changes were made. The bacteria objectives are now on the 2005 priority list. The Regional Board plans to incorporate an *Enterococcus* objective for water contact recreation in ocean waters, an *E. coli* objective for water contact recreation in surface waters, and a fecal coliform objective for shellfish harvesting.

Region 4 – Los Angeles

- REC-1 (freshwater) – Geometric mean for *E. coli* shall not exceed 126 cfu/100 mL; fecal coliform shall not exceed 200 cfu/100 mL. Single sample maximum for *E. coli* shall not exceed 235 cfu/100 mL and fecal coliform shall not exceed 400 cfu/100 mL.

  Region 4 has also adopted the following implementation provisions for REC-1 bacteria objectives - The geometric mean values should be calculated based on a statistically sufficient number of samples (generally not less than five samples equally spaced over a 30-day period). If any of the single sample limits are exceeded, the Regional Board may require repeat sampling on a daily basis until the sample falls below the single sample limit in order to determine the persistence of the exceedance. When repeat sampling is required

because of an exceedance of any one single sample limit, values from all samples collected during that 30-day period shall be used to calculate the geometric mean.

In addition, Region 4 has adopted and EPA has approved a high flow suspension for selected waters:

"The High Flow Suspension shall apply to water contact recreational activities associated with the swimmable goal as expressed in the federal Clean Water Act section 101(a)(2) and regulated under the REC-1 use, non-contact water recreation involving incidental water contact regulated under the REC-2 use, and the associated bacteriological objectives set to protect those activities. Water quality objectives set to protect (1) other recreational uses associated with the fishable goal as expressed in the federal Clean Water Act section 101(a)(2) and regulated under the REC-1 use and (2) other REC-2 uses (e.g., uses involving the aesthetic aspects of water) shall remain in effect at all times for waters where the (ad) footnote appears in Table 2-1a. The High Flow Suspension shall apply on days with rainfall greater than or equal to 1/2-inch and the 24 hours following the end of the 1/2-inch or greater rain event, as measured at the nearest local rain gauge, using local Doppler radar, or using widely accepted rainfall estimation methods. The High Flow Suspension only applies to engineered channels, defined as inland, flowing surface water bodies with a box, V-shaped or trapezoidal configuration that have been lined on the sides and/or bottom with concrete. The water bodies to which the High Flow Suspension applies are identified in Table 2-1a in the column labeled 'High Flow Suspension'."

- REC-2 – In waters designated for non-water contact recreation (REC-1) and not designated for water contact recreation (REC-1), the fecal coliform concentration shall not exceed a log mean of 2,000 cfu/100 mL (based on a minimum of not less than four samples for any 30-day period), nor shall more than 10 percent of the samples collected during any 30-day period exceed 4,000 cfu/100 mL.

  Note: Region 4 is the only region to have formally adopted *E. coli* objectives. In changing from fecal coliform to *E. coli*, the Regional Board's staff report included the following regarding water quality objectives for the REC-2 use:

  > "Staff recommends that the fecal coliform objectives for non-contact recreation (REC-2) remain unchanged at the current time, since no epidemiological studies or research have been conducted focusing on accidental/incidental contact."

<u>Region 5 – Central Valley</u>

- REC-1 - The Basin Plan was amended in 2002 to replace the REC-1 fecal coliform objectives with *E. coli* objectives and provide some implementation language:

"…the *E. coli* concentration, based on a minimum of not less than five samples equally spaced over a 30-day period, shall not exceed a geometric mean of 126 cfu/100 mL and shall not exceed 235 cfu/100 mL in any single sample.

If any single sample limits are exceeded for *E. coli*, the Regional Water Board may require repeat sampling on a daily basis until the sample falls below the single sample limit or for 5 days, whichever is less, in order to determine the persistence of the exceedance.

When repeat sampling is required because of an exceedance of any one single sample limit, values from all samples collected during that 30-day period will be used to calculate the geometric mean. "

The Regional Board website notes that EPA approval is needed prior to the above language becoming effective. Betty Yee of the Regional Board was contacted to determine status. She indicated that the bacteria objectives were not submitted to the State Water Board for approval because there is now a statewide process that is scheduled to present statewide criteria to the State Water Board for adoption in June 2006.

- REC-2 – No water quality objectives have been adopted for the REC-2 use.

Region 6 – Lahonton

The bacteria water quality objectives for Region 6 apply to all surface waters and are not REC use specific:

- The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20 cfu/100 mL, nor shall more than 10 percent of all samples collected during any 30-day period exceed 40 cfu/100 mL. The log mean shall ideally be based on a minimum of not less than five samples collected as evenly spaced as practicable during any 30-day period. However, a log mean concentration exceeding 20 cfu/100 mL for any 30-day period shall indicate violation of this objective even if fewer than five samples were collected.

Region 7 - Colorado River Basin

REC-1 & REC-2 – Based on a statistically sufficient number of samples (generally not less than five samples equally spaced over a 30-day period), the geometric mean of the indicated bacterial densities should not exceed one or the other of the following:

	REC-1	REC-2
E. coli	126 cfu/100 mL	630 cfu/100 mL
Enterococci	33 cfu/100 mL	165 cfu/100 mL

Nor shall any sample exceed the following maximums:

	REC-1	REC-2
E. coli	400 cfu/100 mL	2000 cfu/100 mL
Enterococci	100 cfu/100 mL	500 cfu/100 mL

Except that for the Colorado River, the following maximum shall apply:

	REC-1	REC-2
E. coli	235 cfu/100 mL	1175 cfu/100 mL
Enterococci	61 cfu/100 mL	305 cfu/100 mL

In addition to the objectives above, in waters designated REC-1, the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200 cfu/100 mL, nor shall more than 10 percent of total samples during any 30-day period exceed 400 cfu/100 mL.

Region 8 – Santa Ana

- REC-1 - Fecal coliform: log mean less than 200 cfu/100 mL based on five or more samples/ 30-day period, and not more than 10 percent of the samples exceed 400 cfu/100 mL for any 30-day period.
- REC-2 - Fecal coliform: average less than 2,000 cfu/100 mL and not more than 10 percent of samples exceed 4,000 cfu/100 mL for any 30-day period.

Region 9 – San Diego

- REC-1 – Fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a log mean of 200 cfu/100 mL, nor shall more than 10 percent of total samples during any 30-day period exceed 400 cfu/100 mL.
- REC-2 – In water designated for REC-2 and not designated for REC-1, the average fecal coliform concentrations for any 30-day period, shall not exceed 2,0000 cfu/100 mL nor shall more than 10 percent of samples collected during any 30-day period exceed 4,000 cfu/ 100 mL.

This Regional Board's 2004 triennial review priority list included two "high" priority elements involving recreational uses and bacteria water quality objectives:

- Update and clarify existing water quality objectives for bacteria indicators. Include language in Basin Plan Chapter 3 clarifying how objectives should be interpreted and implemented (e.g., applicability of *E. coli* and *Enterococcus* for use in NPDES permitting). Additionally, develop implementation provisions for bacteria objectives for REC-1

beneficial use. Implementation provisions would not replace water quality objectives but would discuss provisions under which exceedances of water quality objectives would be allowed during wet weather conditions. Implementation provisions may include but are not be limited to incorporation of a reference watershed, or a watershed that is minimally impacted by anthropogenic activities, or such other approaches as may be found appropriate, useful and compatible with EPA guidelines. Such a watershed has a certain amount of exceedances of the water quality objectives during rain events, and these exceedances are due to input from natural sources (wildlife). TMDLs for bacteria would incorporate these implementation provisions as an alternative to using the water quality objectives as written in the Basin Plan.

- Adopt a subcategory of REC-1 called "Wildlife Impacted Recreation" for waterbodies designated with REC-1 beneficial use, which also support an abundance of wildlife (e.g., Children's Pool, La Jolla). In wildlife-impacted areas achieving REC-1 standards for bacteria is difficult. Adoption of the subcategory "Wildlife Impacted Recreation" would reflect the natural levels of bacteria while providing protection to the noncontact recreation beneficial use (REC-2). Consider sub-category for contact recreation (REC-1) in flood control areas and reservoirs where public access is restricted. Revise designated beneficial uses to recognize flood control and its incompatibility with beneficial uses on a case-by-case basis, such as Forrester Creek and Chollas Creek.

Hawaii

Recreational Use Categories

Waters are classified by type and location, e.g., inland vs. marine. There appears to be no specific use designations established, e.g., primary or secondary contact.

Numeric Objectives

For inland waters:

- *Enterococcus* content shall not exceed a geometric mean of 33 cfu/100 mL in not less than five samples that shall be spaced to cover a period between 25 and 30 days. No single sample shall exceed the single sample maximum of 89 cfu/100 mL or the site-specific one-sided 82 percent confidence limit.
- Inland recreational waters in which *Enterococcus* does not exceed the standard shall not be lowered in quality.
- At locations where sampling is less frequent than five samples per 25 to30 days, no single sample shall exceed the single sample maximum nor shall the geometric mean of these samples taken during the 30-day period exceed 33 cfu/100 mL.

Nevada

Recreational Use Categories

Waters are categorized into Classes A, B, C, or D; the applicable recreational use varies. Class A, B, and C are designated with both REC-1 and REC-2; Class D is designated with REC 2 only. Definitions of REC-1 and REC-2 include:

- REC-1 applies to waters where recreation involving contact with the water may occur
- REC-2 applies to waters where recreation not involving contact with the water may occur

Class D waters, where only REC-2 applies are defined as follows: waters or portions of waters located in areas of urban development, highly industrialized or intensively used for agriculture or a combination of the above and where effluent sources include a multiplicity of waste discharges from the highly altered watershed. Very few waters have been categorized as Class D; not clear whether a UAA was required.

Numeric Objectives

Numeric objectives applicable to waterbodies depend on the class of water:

- Class A and B: The fecal coliform concentration, based on a minimum of five samples during any 30-day period, must not exceed a geometric mean of 200 cfu/100 mL nor may more than 10 percent of total samples during any 30-day period exceed 400 cfu/100 mL.
- Class C: The more stringent of the following apply:
  - The fecal coliform concentration must not exceed a geometric mean of 1,000 cfu/100 mL nor may more than 20 percent of total samples exceed 2,400 cfu/100 mL.
  - The annual geometric mean of fecal coliform concentration must not exceed that characteristic of natural conditions by more than 200 cfu/100 mL nor may the number of fecal coliform in a single sample exceed that characteristic of natural conditions by more than 400 cfu/100 mL.
  - The fecal coliform concentration, based on a minimum of five samples during any 30-day period, must not exceed a geometric mean of 200 cfu/100 mL, nor may more than 10 percent of total samples during any 30-day period exceed 400 cfu/100 mL. This is applicable only to those waters used for primary contact recreation.
- Class D: No numeric objectives apply.

In addition to these statewide standards, Nevada has also established site-specific bacteria standards on many of its major waters. These site-specific objectives are based on *E. coli* rather than fecal coliform. Tributaries to Lake Tahoe have a 126 cfu/100 mL single sample maximum standard. Most of the other state waters with *E. coli* objectives use the 126 cfu/100 mL geometric mean as the standard, but the geometric mean is based on an annual calculation. Waters with a 126 cfu/100 mL annual geometric mean also have a single sample maximum of

either 235 or 410 cfu/100 mL. A few waters have either only an annual geometric mean objective of 630 cfu/100 mL or only a single sample maximum of 630 cfu/100 mL.

EPA Region 10

Alaska

Alaska is currently undergoing its triennial review to adopt revised *E. coli* objectives. One of the issues to be addressed is whether to adopt seasonal-based objectives.

Recreational Use Categories

No definitions found. It appears that contact and secondary contact uses apply to all state freshwaters.

Numeric Objectives

- Contact Recreation – In a 30-day period, the geometric mean of fecal coliform samples may not exceed 100 cfu/100 mL, and not more than one sample, or more than 10 percent of the samples if there are more than 10 samples, may exceed 200 cfu/100 mL.
- Secondary Recreation – In a 30-day period, the geometric mean of fecal coliform samples may not exceed 200 cfu/100 mL, and not more than 10 percent of the total samples may exceed 400 cfu/100 mL.

Idaho

Recreational Use Categories

- Primary Contact Recreation – water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to, those used for swimming, water skiing, or skin diving.
- Secondary Contact Recreation – water quality appropriate for recreational uses on or about the water and that are not included in the primary contact category. These activities may include fishing, boating, wading, infrequent swimming, and other activities where ingestion of raw water is not likely to occur.

Numeric Objectives

- Primary Contact Recreation – Waters designated for primary contact recreation are not to contain *E. coli* bacteria significant to the public health in concentrations exceeding:
  - For areas within waters designated for primary contact recreation that are additionally specified as public swimming beaches, a single sample of 235 cfu/100 mL. For the purpose of this subsection, "specified public swimming beaches" are considered to be indicated by features such as signs, swimming docks, diving boards, slides, or the like, boater exclusion zones, map legends, collection of a fee for beach use, or any other unambiguous invitation to public swimming. Privately owned swimming docks or the like which are not open to the general public are not included in this definition.

  - For all other waters designated for primary contact recreation, a single sample of 406 cfu/100 mL
  - A geometric mean of 126 cfu/100 mL based on a minimum of five samples taken every 3 to 5 days over a 30-day period.
- Secondary Contact Recreation – Waters designated for secondary contact recreation are not to contain *E. coli* bacteria significant to the public health in concentrations exceeding:
  - A single sample of 576 cfu/100 mL
  - A geometric mean of 126 cfu/100 mL based on a minimum of five samples taken every 3 to 5 days over a 30-day period.

In addition to the above objectives, the following statements are included in the Idaho water quality standards:

- Numeric water quality standards only apply to intermittent waters during optimum flow periods sufficient to support the uses for which the water body is designated. For recreation, optimum flow is equal to or greater than 5 cfs. In Idaho, intermittent waters are defined as: A stream, reach, or water body which has a period of 0 flow for at least 1 week during most years. Where flow records are available, a stream with a 7Q2 hydrologically-based flow of less than 0.1 cfs is considered intermittent. Streams with natural perennial pools containing significant aquatic life uses are not intermittent.
- The designated use of a waterbody does not imply any rights to access or ability to conduct any activity related to the use designation, nor does it imply that an activity is safe. For example, a designation of primary or secondary contact recreation may occur in areas where it is unsafe to enter the water due to water flows, depth, or other hazardous conditions.
- A single water sample exceeding an *E. coli* standard does not in itself constitute a violation of water quality standards; however, additional samples shall be taken for the purpose of comparing the results to the geometric mean objectives:
  - Any discharger responsible for providing samples for *E. coli* shall take five additional samples The Department shall take five additional samples for ambient *E. coli* samples unrelated to dischargers' monitoring responsibilities.
- Idaho has also successfully conducted UAAs to change the primary contact recreation use to secondary contact primarily based on safety concerns.

Oregon

Recreational Use Categories

Oregon has a single recreational use: water contact recreation, which is applicable to all state waters except Bull Run River and its tributaries (may be a water supply source protection issue).

Numeric Objectives
E. coli - 30-day log mean of 126 cfu/100 mL, based on a minimum of five samples; no single sample may exceed 406 E. cfu/100 mL

Washington

Recreational Use Categories

- Extraordinary Primary Contact – waters providing extraordinary protection against waterborne disease or that serve as tributaries to extraordinary quality shellfish harvesting areas
- Primary Contact Recreation – activities where a person would have direct contact with water to the point of complete submergence including, but not limited to, skin diving, swimming, and water skiing.
- Secondary Contact Recreation – activities where a person's water contact would be limited (e.g., wading or fishing) to the extent that bacterial infections of eyes, ears, respiratory or digestive systems, or urogenital areas would normally be avoided.

Numeric Objectives

- Extraordinary Primary Contact – Fecal coliform organism levels must not exceed a geometric mean value of 50 cfu/100 mL, with not more than 10 percent of all samples (or any single sample when less than 10 sample points exist) obtained for calculating the geometric mean value exceeding 100 cfu/100 mL.
- Primary Contact Recreation – Fecal coliform organism levels must not exceed a geometric mean value of 100 cfu/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 200 cfu/100 mL.
- Secondary Contact Recreation – Fecal coliform organism levels must not exceed a geometric mean value of 200 cfu/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 400 cfu/100 mL

Washington's water quality standards also include the following implementation statements:

- When averaging bacteria sample data for comparison to the geometric mean objectives, it is preferable to average by season and includes five or more data collection events within each period. Averaging of data collected beyond a 30-day period, or beyond a specific discharge event under investigation, is not permitted when such averaging would skew the data set so as to mask noncompliance periods. The period of averaging should not exceed twelve months, and should have sample collection dates well distributed throughout the reporting period.

- When determining compliance with the bacteria objectives in or around small sensitive areas, such as swimming beaches, it is recommended that multiple samples are taken throughout the area during each visit. Such multiple samples should be arithmetically averaged together (to reduce concerns with low bias when the data is later used in calculating a geometric mean) to reduce sample variability and to create a single representative data point.
- As determined necessary by the department, more stringent bacteria objectives may be established for rivers and streams that cause, or significantly contribute to, the de-certification or conditional certification of commercial or recreational shellfish harvest areas, even when the pre-assigned bacteria objectives for the river or stream are being met.
- Where information suggests that sample results are due primarily to sources other than warm-blooded animals (e.g., wood waste), alternative indicator objectives may be established on a site-specific basis by the department.

Appendix B

Portion of EPA letter approving adoption of recreational uses and associated objectives.