

**Surface Water Quality Criteria for Bacteria:
Implementation Guidance for the Protection of Human Health
in Waters Designated for Primary Contact Recreation**



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List of Acronyms

AWQC	Ambient Water Quality Criteria
BAV	Beach Action Value
CFR	Code of Federal Regulations
CFU	Colony Forming Units
CMR	Code of Massachusetts Regulations
CSO	Combined Sewer Overflow
CWA	Clean Water Act
<i>E. coli</i>	<i>Escherichia coli</i>
Enterococci	<i>Enterococcus spp.</i>
EPA	U.S. Environmental Protection Agency
Geomean	Geometric Mean
GI	Gastrointestinal Illness
HCGI	Highly Credible GI
MassDEP	Massachusetts Department of Environmental Protection
MDPH	Massachusetts Department of Public Health
NEEAR	National Epidemiological and Environmental Assessment of Recreational Water
NGI	NEEAR-GI
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
SWD	Surface Water Discharge
RWQC	Recreational Water Quality Criteria
SSM	Single Sample Maximum
STV	Statistical Threshold Value
SWQS	Surface Water Quality Standards
TMDL	Total Maximum Daily Load
WQBEL	Water Quality Based Effluent Limit



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1.0 Purpose and Applicability

The Massachusetts Department of Environmental Protection (MassDEP) amended the Massachusetts Surface Water Quality Standards (SWQS), 314 CMR 4.00, in 2021. The SWQS amendments included adoption of revised bacteria criteria for surface waters that are designated for primary contact recreation¹ (Class A, B, SA, and SB waters). This guidance provides an overview of the criteria and clarifies how the criteria can be implemented.² The criteria will be used for Federal Water Pollution Control Act, 33 USC §1251, et seq. (known as the Clean Water Act or CWA) purposes, such as establishing water quality based effluent limitations (WQBELs) in National Pollutant Discharge Elimination System (NPDES) and Massachusetts Surface Water Discharge (SWD) permits, applying water quality assessment procedures to support decisions under CWA sections 303(d), 305(b), and 314, and developing Total Maximum Daily Loads (TMDLs) to restore the quality of surface waters. This guidance includes comparisons to the prior SWQS recreational bacteria criteria and brief summaries of how the criteria may be implemented in establishing discharge permit effluent limits.

The bacteria criteria for Class C and SC waters remain unchanged. The SWQS regulation does not designate Class C and SC waters for primary contact recreation and, therefore, those waters are not subject to the primary contact recreation bacteria criteria. There are also no Class C or SC waters in Massachusetts. The bacteria criteria for these classes are used only in specific scenarios, such as in certain combined sewer overflow (CSO) monitoring and the assessment of waters for the secondary contact recreational use.

2.0 Introduction and Background

The CWA and associated Water Quality Standards in 40 Code of Federal Regulations (CFR) Part 131 require the U.S. Environmental Protection Agency (EPA) to periodically publish updated or new recommended ambient water quality criteria (AWQC). The CWA and these federal regulations also require States to periodically review and, as appropriate, update AWQC in State regulations. Each State has the option of either adopting the federally recommended criteria or developing its own criteria, subject to EPA review and approval.

EPA has recommended criteria for fecal indicator bacteria since 1976 to protect the public from harmful exposure during recreational activities in waterbodies, such as swimming (EPA 1976). Epidemiological studies in the late 1970s and early 1980s indicated that concentrations of two microorganisms had strong correlation with the presence of harmful pathogens in waters due to fecal contamination: *Escherichia coli* (*E. coli*) in fresh waters and *Enterococcus spp.* (enterococci) in both fresh and marine waters (EPA 1986). These studies led EPA to recommend that bacteria criteria be based on a statistically sufficient number of samples (generally not less

¹ The SWQS define primary contact recreation as: “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.”

² While this document primarily addresses bacteria criteria applicable to waters designated for primary contact recreation, the SWQS also contain bacteria criteria for waters designated for shellfishing and for intakes of unfiltered public water supplies. The bacteria criteria for those uses are still based on fecal coliform (shellfishing) and fecal and total coliform (water supply intakes). Where a waterbody has more than one designated use (e.g., shellfishing and primary contact recreation), the bacteria criteria for both uses apply to the water.



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than five samples equally spaced over a 30-day period), that the geometric mean (geomean)³ for each indicator bacteria not be exceeded, and that samples not exceed a single sample maximum (SSM) based on use intensity. EPA recommended that these samples were to be collected during dry weather.

In 2012, EPA released updated human health bacteria criteria recommendations for all waters designated for primary contact recreational uses (*Recreational Water Quality Criteria* (RWQC); EPA 2012). The 2012 criteria recommendations replace EPA's 1986 recommendations and are based on the latest research and science linking illnesses to fecal contamination in recreational waters. Two sets of bacteria criteria, one for fresh waters (*E. coli* and enterococci) and one for marine waters (enterococci), are included in EPA's 2012 guidance, with each set reflective of a different illness rate⁴ (32 or 36 illnesses per 1,000 persons). EPA recommends that, over a 30-day duration, geomean not-to-exceed magnitudes be applied concurrently with statistical threshold values (STVs) that are not to be exceeded by more than 10% of samples. States also have the option to use SSM bacteria levels called "Beach Action Values," or BAVs, for beach management decisions (i.e., advisories or closures) when potentially harmful levels of bacteria are detected in surface waters. BAVs are discussed in EPA's 2012 guidance, but unlike geomeans and STVs, BAVs are not a component of EPA's bacteria criteria recommendations. In addition, EPA no longer recommends that States include a minimum sample size for recreational bacteria criteria; however, EPA also acknowledges that larger sample sizes increase the statistical accuracy of criteria evaluations (e.g., for use attainment decisions).

The 2021 amendments to the Massachusetts SWQS include the following (additional information is provided in Section 3):

- Adoption of EPA's 2012 bacteria criteria recommendations in both fresh and coastal and marine waters reflecting the rate of 36 illnesses per 1,000 persons.
 - The current criteria replace the previous criteria based on EPA's 1986 recommendations.
 - The geomean magnitudes are almost unchanged, with only a minor revision of the freshwater enterococci criterion (from 33 to 35 cfu/100 mL).
- Replacement of SSM criteria by STVs.
- Elimination of minimum sample numbers.
- Shortening of the criteria evaluation durations.

³ A geomean is calculated by multiplying all *E. coli* or enterococci concentration data for samples collected within a specific interval and then taking the n^{th} root of the product (where n is the number of samples).

⁴ The estimated illness rate is the National Epidemiological and Environmental Assessment of Recreational Water Gastrointestinal Illness, or NEEAR-GI (NGI). The NGI is broader than the Highly Credible Gastrointestinal Illness (HCGI) used for EPA's 1986 criteria recommendations; thus, "more illness cases were reported and associated with aquatic recreation in the NEEAR study using the NGI definition of illness, at the same level of water quality using the previous illness definition (i.e., HCGI)" (EPA 2012).



3.0 Comparison of the Previous and Current Bacteria Criteria

3.1 Previous Bacteria Criteria in the SWQS

The previous bacteria criteria in the SWQS included magnitude, duration, and frequency components. The geomean criteria duration for beaches was a single bathing season using the most recent five *E. coli* and/or enterococci samples. For waters outside of bathing beaches (“other waters”), the geomean evaluation period was the most recent six months, typically based on a minimum of five samples. For all waters, the geomean of the samples collected within the respective durations could not exceed the applicable criteria magnitudes, and no single sample could exceed the SSM criteria magnitudes. These criteria allowed for flexibility in geomean calculations (i.e., using static or rolling evaluation periods). Table 1 summarizes MassDEP’s previous primary contact recreational bacteria criteria.

Table 1. Previous bacteria criteria in the Massachusetts Surface Water Quality Standards, based on the 1986 EPA water quality criteria recommendations.

Bacteria	Fresh Waters		Applicable Classes	Coastal and Marine Waters		Applicable Classes
	Geomean (colonies/100 mL)	SSM ^a (colonies/100 mL)		Geomean (colonies/100 mL)	SSM (colonies/100 mL)	
<i>E. coli</i>	126	235	Class A, B	-- ^b	-- ^b	Class SA, SB
Enterococci	33	61	Class A, B	35	104	Class SA, SB

^a Single Sample Maximum
^b *E. coli* is not an indicator bacterium for marine waters.

3.2 Current Bacteria Criteria in the SWQS

The current bacteria criteria in the SWQS, based on EPA’s 2012 criteria recommendations, also include magnitude, duration, and frequency components. The criteria reflect an estimated illness rate of 36 per 1,000 primary contact recreators. Changes from the previous criteria include:

- **Replacement of the SSM criteria magnitudes with the STV criteria magnitudes.** No more than 10 percent of samples should exceed the STV over the applicable 30- or 90-day or smaller interval (“30-day” or “90-day”). For example, if fewer than 10 samples are collected over the interval, none of the samples should exceed the applicable STV magnitude; however, if 10 or more samples are collected, one or more of the samples, respectively, can exceed the applicable STV magnitude. Although the STV criteria magnitudes are higher concentrations than the previous SSMs, the bacteria criteria maintain protectiveness by applying both the STV and geomean criteria magnitudes to the same data over the same period. The protectiveness of the criteria is explored in more detail within Sections 4.0 and 5.0.
- **Elimination of the minimum sample number requirement.** EPA determined that criteria are more protective when the geomean and STV criteria apply concurrently over their respective intervals, regardless of sample number; however, EPA also acknowledges that larger sample sizes increase the statistical accuracy of criteria evaluations.



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- Application of shorter criteria evaluation intervals.** The criteria apply to a 90-day criteria evaluation interval for most surface waters throughout the calendar year⁵, with a shorter 30-day interval for waters with a high frequency of primary contact recreation (i.e., public and semi-public beaches during the bathing season; reverting to 90-day outside of the bathing season) and surface waters impacted by discharges from CSOs and publicly-owned treatment works (POTW). CSO- and POTW-impacted surface waters include those segments with a “CSO” qualifier or those described as having a POTW discharge at the beginning of the segment in Tables 1 through 27 at 314 CMR 4.06(6)(b). These impacted segments start at the point of discharge and continue to the defined boundary of the segment, as described in the tables. If surface waters that are not listed in the SWQS tables receive these types of discharges, the 30-day evaluation interval applies, at minimum, from the discharge point downstream to the confluence with a named surface water. The length of the impacted reach may extend farther depending on the size of the drainage area and any tributary surface water(s), and the presence of other upstream or downstream CSO and/or POTW discharges. For coastal and marine segments that are not described in the standards, evaluations would apply to the surface water as described in MassDEP’s current Integrated List of Waters. Regardless of the interval (i.e., 30- or 90-days), calculations for both the geomean and the STV criteria magnitudes are conducted concurrently (see Section 4.0). A criterion exceedance occurs when the calculated geomean from the sample data is greater than the applicable geomean criterion magnitude and/or when more than 10% of the samples exceed the STV criterion magnitude (i.e., both the geomean and STV criteria need to be met).
- Application of the criteria for both dry and wet weather data.** EPA’s 2012 criteria were developed using data collected under all types of weather conditions and can therefore be applied to data collected during wet or dry weather.

The geomean and STV criteria magnitudes, and the classes of water to which they apply, are listed in

Table 2.

Table 2. Bacteria criteria in the Massachusetts Surface Water Quality Standards (314 CMR 4.00), promulgated in 2021, based on the 2012 EPA criteria recommendations.

Bacteria	Fresh Waters		Applicable Classes	Coastal and Marine Waters		Applicable Classes
	Geomean (cfu ^a /100 mL)	STV ^b (cfu ^a /100 mL)		Geomean (cfu ^a /100 mL)	STV (cfu ^a /100 mL)	
<i>E. coli</i>	126	410	Class A, B	-- ^c	-- ^c	Class SA, SB
Enterococci	35	130	Class A, B	35	130	Class SA, SB

^a Colony forming units.
^b Statistical Threshold Value, a value not to be exceeded by more than 10% of samples.
^c *E. coli* is not an indicator bacterium for marine waters.

⁵ Section 6.0 explains how the criteria may be applied seasonally in accordance with 314 CMR 4.05(5)(f)4.



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3.3 Sampling Implications

MassDEP removed the minimum sample requirement from the SWQS to be consistent with EPA's criteria recommendations. EPA notes in the 2012 guidance document that "[S]tates should not include a minimum sample size as part of their criteria submission" (EPA 2012). However, EPA recommends at least weekly sampling in their 2012 guidance, as "a larger dataset will more accurately characterize the water quality in a waterbody" (EPA 2012). Methodologies for collecting and analyzing bacteria samples, including the number of samples or sampling intervals, can vary dependent on water quality monitoring guidelines, SWD or NPDES permit requirements, use attainment evaluations as described in the Massachusetts Consolidated Assessment and Listing Methodology (CALM) Guidance Manual, or other regulations applicable to surface waters.

3.4 Beach Action Values (BAV)

EPA's 2012 guidance includes discussion on optional SSM bacteria levels called Beach Action Values (BAVs) for beach management decisions (i.e., advisories or closures when potentially harmful levels of bacteria are detected in surface waters). The SWQS bacteria criteria do not include BAVs because MassDEP does not make beach closure decisions. MassDEP coordinated with MDPH during the revision of the bacteria criteria to ensure that the SWQS aligned with MDPH regulations. Beach operators make closure decisions based on exceedances of geomean and Beach Notification Threshold (BNT) values for *E. coli* and enterococci. MDPH requires at least weekly sampling during the bathing season⁶, calculating the geomean of indicator organisms using the five most recent samples within the same bathing season (105 CMR 445.031: Indicator Organisms). For beach closure decisions, MDPH has communicated to EPA that their approach using geomeans and BNTs is as protective as the 2014 National Beach Guidance and Required Performance Criteria for Grants as demonstrated by a comprehensive analysis of local water quality data. The 2014 guidance is based on the 2012 EPA criteria recommendations. Therefore, the SWQS amendments do not conflict with MDPH regulations.

4.0 Criteria Evaluation Intervals and Calculations

Bacteria concentrations in surface waters are compared to the criteria using static or rolling evaluations that are conducted concurrently for both the geomean calculations and STV comparisons (for an example, see **Table 3** below). The appropriate duration interval to apply (i.e., 30 or 90 days) is based on the waterbody classification and qualifiers (see Section 3.2). Criteria evaluations may vary depending on: (1) the characteristics of the sample dataset, including the number of samples, the frequency of collection, and the sampling duration; and (2) the objective of the evaluation, such as for TMDLs, SWD or NPDES permits, or use attainment evaluations of the primary contact recreational use in accordance with the CALM Guidance Manual.

4.1 Example Rolling Interval Evaluation

Consider a hypothetical scenario where wet or dry *E. coli* samples are typically collected weekly from April to October in a Class B water and a 30-day evaluation interval applies (Table 3). Rolling weekly geomean calculations and STV comparisons can be made for each 30-day interval and compared to the applicable

⁶ The dates for the bathing season vary according to the operator of the bathing facility.



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criteria.⁷ The calculated geomeans for each 30-day interval range from 20 to 560 cfu/100 mL, with eight of the geomeans exceeding the criterion of 126 cfu/100 mL. Bacteria concentrations within each interval are compared directly to the STV criterion because there are fewer than ten samples within the intervals. In this example, bacteria concentrations in six of the 30-day evaluation intervals exceeded the STV criterion of 410 cfu/100 mL.

Table 3. A hypothetical scenario of *E. coli* samples collected in a Class B water where a 30-day evaluation interval applies. Rolling criteria evaluations (i.e., geomean and STV) are performed on each unique dataset within the interval. For example, data from Weeks 2 to 6 are unique when compared to Weeks 3 to 7. However, data from Weeks 7 to 11 and Weeks 8 to 12 are identical because of limited samples. Criteria evaluations are not repeated for identical datasets.

Month	Week	<i>E. Coli</i> Concentration (cfu/100 mL)	30-Day Geomean (cfu/100 mL)	Geomean Criterion Exceeded? (126 cfu/100 mL)	STV Criterion Exceeded? (410 cfu/100 mL)	Meets SWQS?
April	1	63	63	No	No	Yes
April	2	35	47	No	No	Yes
April	3	20	35	No	No	Yes
April	4	80	43	No	No	Yes
May	5	100	51	No	No	Yes
May	6	300	70	No	No	Yes
May	7		83	No	No	Yes
May	8	560	191	Yes	Yes	No
June	9		256	Yes	Yes	No
June	10		410	Yes	Yes	No
June	11		560	Yes	Yes	No
June	12					
July	13					
July	14					
July	15	300	300	Yes	No	No
July	16	200	245	Yes	No	No
August	17	45	139	Yes	No	No
August	18	10	72	No	No	Yes
August	19					
August	20		45	No	No	Yes
September	21	25	22	No	No	Yes
September	22	34	20	No	No	Yes
September	23		29	No	No	Yes
September	24					
October	25	621	81	No	Yes	No
October	26		145	Yes	Yes	No

⁷ For each weekly sample in the hypothetical scenario, the rolling geomean calculations and STV comparisons include any previously collected samples for the past 30 days.



5.0 Protectiveness of the Bacteria Criteria

MassDEP has conducted evaluations that indicate that the bacteria criteria provide increased protection for primary contact recreation as compared to the previous criteria. These evaluations involved analyses of a hypothetical long-term bacteria dataset containing both enterococci and *E. coli* data. The analyses evaluated the impact of bacteria criteria revisions to waters subject to both the 30-day and the 90-day criteria durations. A summary of these analyses is provided below.

5.1 Duration Evaluation

Using the hypothetical dataset, MassDEP evaluated changes to the number of criteria exceedances that occur when the duration is shortened from six months to 30- or 90-days. For the analyses, enterococci and *E. coli* data were analyzed separately. First, bacteria concentration values were randomly selected from the dataset to represent weekly sampling events over a one-year window. This selection process was repeated 1,000 times to create multiple hypothetical datasets for evaluation. For each of these 1,000 hypothetical datasets, annual criteria exceedance rates were calculated using the various duration intervals and criteria magnitudes (i.e., geomeans, SSMs, and STVs) from the previous and current criteria and using a daily rolling evaluation method.

For the geomean calculations, the current bacteria criteria resulted in an overall greater number of exceedances for both indicator bacteria, regardless of which interval was used. When comparing the SSM to the STV, the current bacteria criteria resulted in at least double the number of exceedances for both indicator bacteria, regardless of which interval was used (see Figure 1 and Figure 2).

The following generalizations can be made from the analyses:

1. The current geometric mean approaches result, on average, in a greater number of exceedances per year than the prior approach. In the analyses, the shortest geomean period in the SWQS (30 days) produced the greatest exceedance rate.
2. The STV approaches result, on average, in a greater number of exceedances per year than the SSM approach, despite STVs that are higher than SSM values for similar water classes and bacteria. Like the geomean comparisons, the shortest STV evaluation interval (30 days) produced the greatest exceedance rate.

While individual surface water evaluations may differ from these results, in general, MassDEP's analyses indicate that the current bacteria criteria are, on average, more conservative (i.e., more stringent) compared to the previous criteria.



MEAN NUMBER OF EXCEEDANCES PRIOR VS. CURRENT GEOMETRIC MEAN CRITERIA

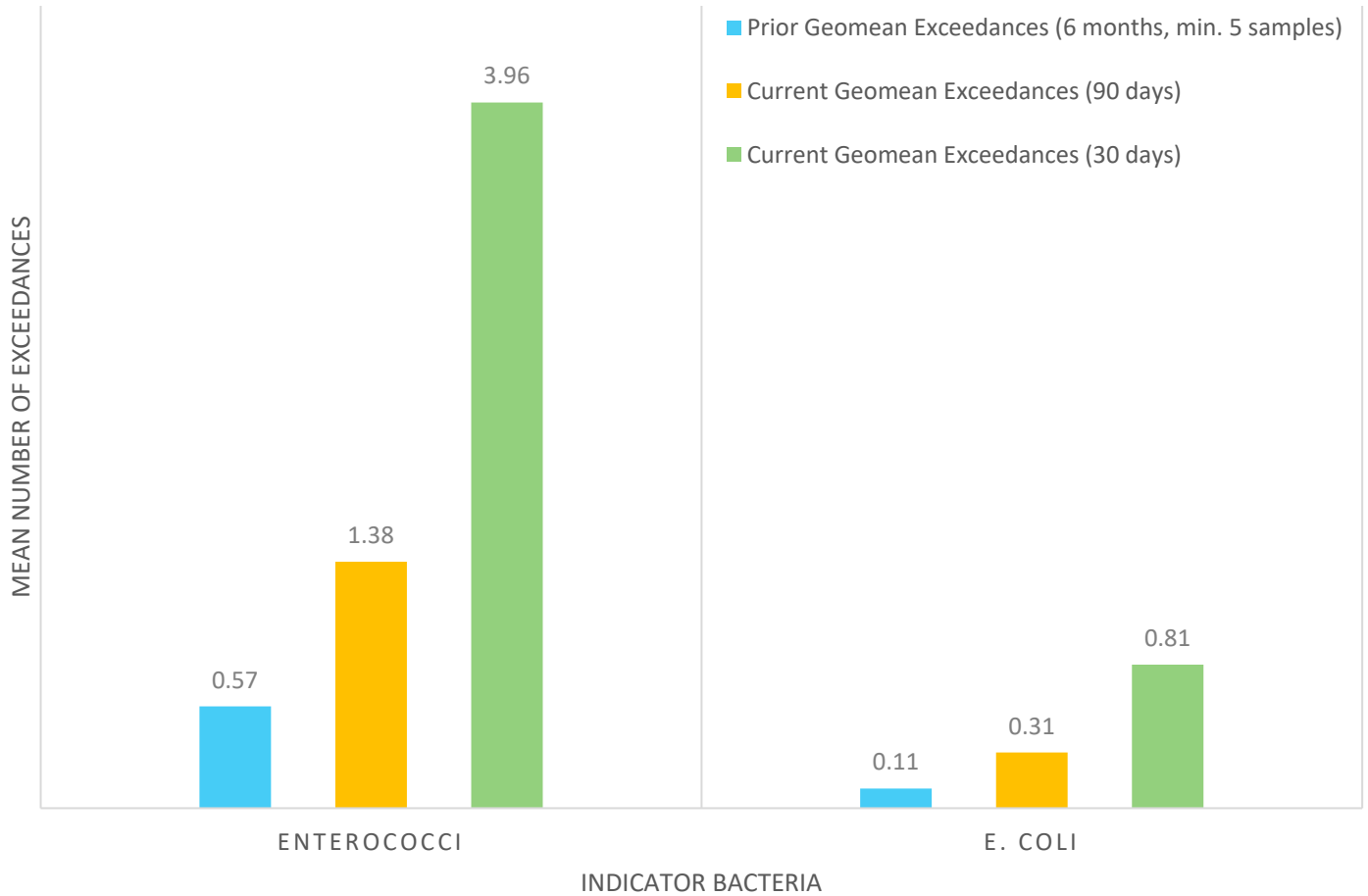
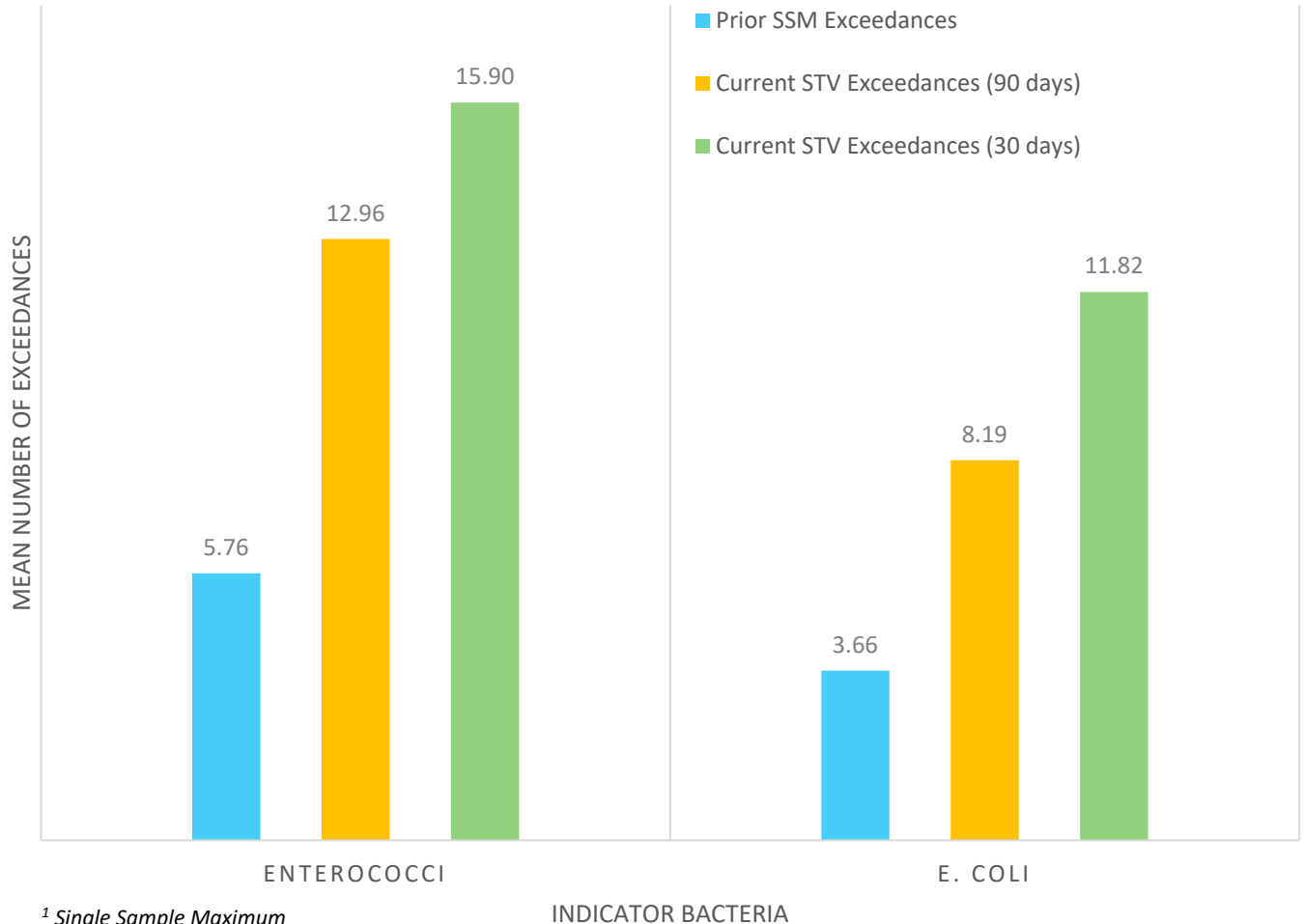


Figure 1. Values for both enterococci and *E. coli* were randomly selected from a bacterial dataset to represent weekly sampling events over a one-year window. Additional values were iteratively selected to create 1,000 annual hypothetical datasets for evaluation. Daily rolling evaluations were used for each annual dataset to determine the number of exceedances using previous and current geometric mean criteria magnitudes for enterococci and *E. coli* over 30- and 90-day intervals. The number of exceedances for each year was averaged across the 1,000 datasets. The current criteria result, on average, in a larger number of exceedances compared to the previous criteria.



MEAN NUMBER OF EXCEEDANCES PRIOR SSM¹ VS. CURRENT STV² CRITERIA



¹ Single Sample Maximum

² Statistical Threshold Value

Figure 2. Values for both enterococci and *E. coli* were randomly selected from a bacterial dataset to represent weekly sampling events over a one-year window. Additional values were iteratively selected to create 1,000 annual hypothetical datasets for evaluation. Daily rolling evaluations were used for each annual dataset to determine the number of exceedances using previous single sample maximum (SSM) and current statistical threshold value (STV) criteria magnitudes for enterococci and *E. coli* over 30- and 90-day intervals. The number of exceedances for each year was averaged across the 1,000 datasets. The current criteria result, on average, in a larger number of exceedances compared to the previous criteria.

6.0 Weather Conditions and Seasonal Considerations

EPA derived the STV criteria magnitudes from the observed pooled variance of the indicator bacteria data reported over the full set of epidemiological studies. The STV criteria are therefore representative of a wide



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range of weather and hydrological conditions (EPA 2012). Both wet and dry weather samples are considered when evaluating bacteria data against the criteria.

Surface water quality must meet the SWQS recreational bacteria criteria year-round, unless MassDEP uses its discretion to apply the criteria seasonally in accordance with 314 CMR 4.05(5)(f). In these cases, MassDEP determines whether, because of a reduction in primary contact recreation during a specified period, such criteria are not needed to be protective. Bases for such determinations usually include identification of periods when frequency of use is reduced due to cold weather (typically from November through March) but could consider other relevant and appropriate factors, such as documentation that primary contact recreation does not occur at a specific location. For SWD and NPDES permits, these determinations are documented in writing within the provisions of the permit issued pursuant to 314 CMR 3.00: *Surface Water Discharge Permit Program* and are made publicly available through MassDEP’s SWD Permit and/or EPA’s Massachusetts Final Individual NPDES Permits webpages. For the purposes of CWA attainment decisions, surface waters are not assessed for primary contact recreation use from November through March, as documented in MassDEP’s Consolidated Assessment and Listing Methodology (CALM) Guidance Manual for the 2022 Reporting Cycle.

7.0 Analytical Methods

EPA has approved analytical methods for *E. coli* and enterococci in both ambient waters and wastewater. Although NPDES permits generally do not require permittees to monitor ambient water quality, MassDEP has the authority (for example, pursuant to 314 CMR 3.00: *Surface Water Discharge Permit Program*) to require such monitoring. The EPA-approved methods for analyzing *E. coli* and enterococci in ambient waters are listed in Table 4. EPA-approved methods for analyzing *E. coli* and enterococci in ambient waters.

Part 136—Guidelines Establishing Test Procedures for the Analysis of Pollutants).

Table 4. EPA-approved methods for analyzing *E. coli* and enterococci in ambient waters.

Parameter and Units	Standard Methods	AOAC, ASTM, USGS	Other
<i>E. coli</i> , number per 100 mL	9221 B.3-2014, 9221 F-2014		
	9223 B-2016	991.15	Colilert [®] , Colilert-18 [®]
	9222 B-2015, 9222 I-2015, 9213 D-2007	D-5392-93	
			mColiBlue-24 [®]
Enterococci, number per 100 mL	9230 D-2013	D6503-99	Enterolert [®]
	9230 C-2013	D5259-92	
	9230 C-2013		



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More information on the above methods can be found in EPA's 2003 amendment⁸ to 40 CFR Part 136 or EPA's website (<https://www.epa.gov/cwa-methods/approved-cwa-microbiological-test-methods#ambient>). When MassDEP requires or conducts ambient water quality monitoring, an applicable EPA-approved method(s) must be used, unless MassDEP approves additional or alternative procedures in accordance with 314 CMR 4.03(6)(b).

8.0 Application of the Bacteria Criteria in Discharge Permits

New SWD and NPDES permits or permit renewals that include water quality-based effluent limitations (WQBELs) for bacteria must implement the new bacteria criteria if the discharge will impact waters designated for primary contact recreation. If a discharge is expected to affect a shellfishing area,⁹ then the bacteria criteria for that use would also apply. Moreover, as noted above, MassDEP has discretion to apply the bacteria criteria that are protective of primary contact recreation on a seasonal basis (see Section 6.0).¹⁰ The bacteria criteria applicable to waters designated for shellfishing apply year-round.

Pursuant to the federal regulations applicable to SWD and NPDES permits, effluent limitations necessary to meet water quality standards are stated as average weekly, average monthly, and/or maximum daily limitations. For a 30-day duration scenario, MassDEP anticipates that the bacteria criteria will be implemented in permits such that the monthly average effluent limit will be equal to the appropriate geometric mean, and the maximum daily effluent limit will be equal to the corresponding STV. When a permit incorporates seasonality, the criteria apply only to the relevant primary contact recreation season.

In deciding whether to use the *E. coli* or enterococci criteria for primary contact recreation as the basis for WQBELs in permits for discharges to inland waters, MassDEP will consider which indicator organisms are already being monitored by the local authorities conducting water quality monitoring in waters impacted by the discharge as well as which indicator organisms were used in previous permits. MassDEP would also review water quality monitoring data collected by groups such as watershed associations. For public and semi-public bathing beach waters, such water quality monitoring generally would be conducted pursuant to MDPH regulations. Absent local or other relevant water quality monitoring being conducted for enterococci, MassDEP intends to use *E. coli* WQBELs for discharges to fresh waters.

⁸ *Guidelines Establishing Test Procedures for the Analysis of Pollutants; Analytical Methods for Biological Pollutants in Ambient Water*. 68 FR 43271, published 7/21/2003 and effective 8/20/2003.

⁹ For purposes of this guidance, shellfishing area means water that is a Massachusetts Division of Marine Fisheries (DMF) approved, conditionally approved, restricted, or conditionally restricted shellfishing area, regardless of whether it is designated in the SWQS for shellfishing.

¹⁰ See *Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants In Surface Waters*, February 23, 1990, for information on the seasonal application of disinfection requirements.



9.0 References

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