DRAFT

[The entirety of the following text, except the italicized annotations, is proposed to be adopted as the Fecal Bacteria Water Quality Objectives Basin Plan Amendment (Bacteria WQOs BPA). The Bacteria WQOs BPA would constitute new regulatory language. Several editorial revisions may be made when the Bacteria WQOs BPA is incorporated into the Water Quality Control Plan for the Lahontan Region (Basin Plan). Editorial revisions may include, but are not limited to, changes to the title page, table of contents, appendices, page numbers, table and figure numbers, footnote numbers, headers and footers, and other non-substantive changes to improve accessibility of the document.]

Basin Plan Amendments for fecal bacteria water quality objectives

[The amendments include changes to Basin Plan Chapter 3 (water quality objectives) and Chapter 5 (water quality standards and control measures for the Lake Tahoe Basin). Text that will be removed from the Basin Plan is preceded with '[The following text is removed]:,' text that will be added to the Basin Plan is preceded with '[The following text is inserted]:']

Changes to Basin Plan Chapter 3, Page 4

[The following text is removed]:

Bacteria, Coliform

Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.

The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 ml, nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 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 20/100 ml for any 30-day period shall indicate violation of this objective even if fewer than five samples were collected.

[The following text is inserted]:

Fecal Indicator Bacteria

Surface waters designated for Water Contact Recreation (REC-1):

The State Water Resources Control Board (State Water Board) established two bacteria water quality objectives applicable to all surface waters with the REC-1 beneficial use, depending on the salinity level, and an implementation plan in 'Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California — Bacteria Provisions and a Water Quality Standards Variance Policy' (Bacteria Provisions)' adopted with State Water Board Resolution No. 2018-0038. The Bacteria Provisions should be consulted in their entirety for a complete accounting of

the water quality objectives and associated implementation provisions. The water quality objectives are summarized below.

Escherichia Coli (E. coli)

The bacteria water quality objective for all waters where the salinity is equal to or less than 1 part per thousand (ppth) 95 percent or more of the time during the calendar year is: a six-week rolling geometric mean (GM) of E. coli not to exceed 100 colony forming units (cfu) per 100 milliliters (mL), calculated weekly, and a Statistical Threshold Value (STV) of 320 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

United States Environmental Protection Agency (U.S. EPA) recommends using U.S. EPA Method 1603 or other equivalent method to measure culturable E. coli.

Enterococci

The bacteria water quality objective for all waters where the salinity is greater than 1 ppth more than 5 percent of the time during the calendar year is: a six-week rolling geometric mean of enterococci not to exceed 30 cfu/100 mL, calculated weekly, with a STV of 110 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

U.S. EPA recommends using U.S. EPA Method 1600 or other equivalent method to measure culturable enterococci.

Table 3 - 0. REC-1 Bacteria Water Quality Objectives

Applicable Waters	Objective Elements	Estimated Illness Rate (NGI): 32 per 1,000 water contact recreators Magnitude (cfu/100 mL)	
	Indicator	GM	STV
All waters where the salinity is equal to or less than 1 ppt 95 percent or more of the time	E. coli	100	320
All waters where the salinity is greater than 1 ppt more than 5 percent of the time	Enterococci	30	110

Table notes:

1. The waterbody GM shall not be greater than the applicable GM magnitude in any six-week interval, calculated weekly. The applicable STV shall not be exceeded by more than 10 percent of the samples collected in a CALENDAR MONTH, calculated in a static manner.
2. NGI = National Epidemiological and Environmental Assessment of Recreational Water gastrointestinal illness rate
3. GM = geometric mean
4. STV = statistical threshold value
5. cfu = colony forming units
6. ppt = parts per thousand
7. ml = milliliters

Changes to Basin Plan Chapter 3, Page 6, Susanville Hydrologic Unit

[The following text is removed]:

Bacteria, Fecal Coliform

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 20/100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 75/100 ml.

Changes to Basin Plan Chapter 3, Page 16, 'References to "Means"…'

[The following text is removed]:

References to "Means" (e.g., annual mean, log mean, mean of monthly means), "Medians" and "90th Percentile Values"

"Mean" is the arithmetic mean of all data. **"Annual mean"** is the arithmetic mean of all data collected in a one-year period. **"Mean of monthly means"** is the arithmetic mean of 30-day averages (arithmetic means). A logarithmic or **"log mean"** (used in determining compliance with bacteria objectives) is calculated by converting each data point into its log, then calculating the mean of these values, then taking the anti-log of this log transformed average. The **median** is the value that half of the values of the population exceed, and half do not. The **average value** is the arithmetic mean of all data. For a **90th percentile value**, only 10% of data exceed this value.

[The following text is inserted]:

References to "Means" (e.g., annual mean, geomean, mean of monthly means), "Medians", "90th Percentile Values" and Statistical Threshold Values

"Mean" is the arithmetic mean of all data. **"Annual mean"** is the arithmetic mean of all data collected in a one-year period. **"Mean of monthly means"** is the arithmetic mean of 30-day averages (arithmetic means). A geometric mean or **"geomean"** is a type of

mean that indicates the central tendency or typical value of a set of numbers by using the product of their values (as opposed to the arithmetic mean which uses their sum). The geomean is defined as the nth root of the product of n numbers. The formula is expressed as: GM = $\sqrt{(x1)(x2)(x3) \dots (xn)}\, n$, where x is the sample value and n is the number of samples taken. The **median** is the value that half of the values of the population exceed, and half do not. The **average value** is the arithmetic mean of all data. For a **90th percentile value**, only 10% of data exceed this value. A **statistical threshold value (STV)** for the fecal indicator bacteria water quality objectives is a set value that approximates the 90th percentile of the water quality distribution of a bacterial population.

Changes to Basin Plan Chapter 3, Page 16, 'bacterial analyses' paragraph

[The following text is removed]:

For bacterial analyses sample dilutions should be performed so the range of values extends from 2 to 16,000. The detection method used for each analysis shall be reported with the results of the analysis. Detection methods used for coliforms (total and fecal) shall be those presented in Standard Methods for the Examination of Water and Wastewater (American Public Health Association et al.), or any alternative method determined by the Regional Board to be appropriate.

[The following text is inserted]:

For bacterial analyses, the detection method used for each analysis shall be reported with the results of the analysis. Detection methods used for fecal indicator bacteria (FIB) shall be those presented in the most recent addition of Standard Methods for the Examination of Water and Wastewater (American Public Health Association et al.), or any alternative method determined by the Regional Board to be appropriate.

Changes to Basin Plan Chapter 4.9, Page 19, column 2, paragraph 1

[The following text is removed]:

Rangeland streams can show increased coliform bacterial levels with fecal coliform levels tending to increase as intensity of livestock use increases. Fecal coliforms serve as indicators that pathogens could exist and flourish.

[The following text is inserted]:

Rangeland streams may be impacted by fecal bacteria, demonstrated by increased fecal indicator bacteria levels as intensity of livestock use increases. Fecal indicator bacteria are indicators that pathogens may be present in a surface water.

Changes to Basin Plan Chapter 5.1, Page 6

[The following text is deleted]:

Bacteria, Coliform

Waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes.

The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 ml, nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 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 20/100 ml for any 30-day period shall indicate violation of this objective even if fewer than five samples were collected.

[The following text is inserted]:

Fecal Indicator Bacteria

Surface waters designated for Water Contact Recreation (REC-1):

The State Water Resources Control Board (State Water Board) established two bacteria water quality objectives applicable to all surface waters with the REC-1 beneficial use, depending on the salinity level, and an implementation plan in 'Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California — Bacteria Provisions and a Water Quality Standards Variance Policy' (Bacteria Provisions)' adopted with State Water Board Resolution No. 2018-0038. The Bacteria Provisions should be consulted in their entirety for a complete accounting of the water quality objectives and associated implementation provisions. The water quality objectives are summarized below.

Escherichia Coli (E. coli)

The bacteria water quality objective for all waters where the salinity is equal to or less than 1 part per thousand (ppth) 95 percent or more of the time during the calendar year is: a six-week rolling geometric mean (GM) of E. coli not to exceed 100 colony forming units (cfu) per 100 milliliters (mL), calculated weekly, and a Statistical Threshold Value (STV) of 320 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

United States Environmental Protection Agency (U.S. EPA) recommends using U.S. EPA Method 1603 or other equivalent method to measure culturable E. coli.

Enterococci

The bacteria water quality objective for all waters where the salinity is greater than 1 ppth more than 5 percent of the time during the calendar year is: a six-week rolling geometric mean of enterococci not to exceed 30 cfu/100 mL, calculated weekly, with a STV of 110 cfu/100 mL not to be exceeded by more than 10 percent of the samples collected in a calendar month, calculated in a static manner.

U.S. EPA recommends using U.S. EPA Method 1600 or other equivalent method to measure culturable enterococci.

Table 5 - 0. REC-1 Bacteria Water Quality Objectives

Applicable Waters	Objective Elements	Estimated Illness Rate (NGI): 32 per 1,000 water contact recreators Magnitude (cfu/100 mL)	
	Indicator	GM	STV
All waters where the salinity is equal to or less than 1 ppt 95 percent or more of the time	E. coli	100	320
All waters where the salinity is greater than 1 ppt more than 5 percent of the time	Enterococci	30	110

Table notes:

1. The waterbody GM shall not be greater than the applicable GM magnitude in any six-week interval, calculated weekly. The applicable STV shall not be exceeded by more than 10 percent of the samples collected in a CALENDAR MONTH, calculated in a static manner.
2. NGI = National Epidemiological and Environmental Assessment of Recreational Water gastrointestinal illness rate
3. GM = geometric mean
4. STV = statistical threshold value
5. cfu = colony forming units
6. ppt = parts per thousand
7. ml = milliliters

Changes to Basin Plan Chapter 5.1, Page 12, 'References to "Means"…'

[The following text is removed]:

References to "Means" (e.g., annual mean, log mean, mean of monthly means), "Medians" and "90th Percentile Values"

"Mean" is the arithmetic mean of all data. **"Annual mean"** is the arithmetic mean of all data collected in a one-year period. **"Mean of monthly means"** is the arithmetic mean

of 30-day averages (arithmetic means). A logarithmic or **"log mean"** (used in determining compliance with bacteria objectives) is calculated by converting each data point into its log, then calculating the mean of these values, then taking the anti-log of this log transformed average. The **median** is the value that half of the values of the population exceed, and half do not. The **average value** is the arithmetic mean of all data. For a **90th percentile value**, only 10% of data exceed this value.

[The following text is inserted]:

References to "Means" (e.g., annual mean, geomean, mean of monthly means), "Medians", "90th Percentile Values" and Statistical Threshold Values

"Mean" is the arithmetic mean of all data. **"Annual mean"** is the arithmetic mean of all data collected in a one-year period. **"Mean of monthly means"** is the arithmetic mean of 30-day averages (arithmetic means). A geometric mean or **"geomean"** is a type of mean that indicates the central tendency or typical value of a set of numbers by using the product of their values (as opposed to the arithmetic mean which uses their sum). The geomean is defined as the nth root of the product of n numbers. The formula is expressed as: $GM = \sqrt[n]{(x_1)(x_2)(x_3) \dots (x_n)}$, where x is the sample value and n is the number of samples taken. The **median** is the value that half of the values of the population exceed, and half do not. The **average value** is the arithmetic mean of all data. For a **90th percentile value**, only 10% of data exceed this value. A **statistical threshold value (STV)** for the fecal indicator bacteria water quality objectives is a set value that approximates the 90th percentile of the water quality distribution of a bacterial population.

Changes to Basin Plan Chapter 5.1, Page 12, 'bacterial analyses' paragraph

[The following text is removed]:

For bacterial analyses sample dilutions should be performed so the range of values extends from 2 to 16,000. The detection method used for each analysis shall be reported with the results of the analysis. Detection methods used for coliforms (total and fecal) shall be those presented in Standard Methods for the Examination of Water and Wastewater (American Public Health Association et al.), or any alternative method determined by the Regional Board to be appropriate.

[The following text is inserted]:

For bacterial analyses, the detection method used for each analysis shall be reported with the results of the analysis. Detection methods used for fecal indicator bacteria (FIB) shall be those presented in the most recent addition of Standard Methods for the Examination of Water and Wastewater (American Public Health Association et al.), or any alternative method determined by the Regional Board to be appropriate.