

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION**

**MEETING OF NOVEMBER 12-13, 2014
BARSTOW, CA**

ITEM: 6

SUBJECT: STATUS REPORT ON BACTERIA WATER QUALITY
OBJECTIVES PROJECT

CHRONOLOGY: This is a new report.

INTRODUCTION: The 2012 Triennial Review list, adopted by the Lahontan Water Board on January 17, 2013, listed one of the highest priority projects titled, "Revise Water Quality Objectives for Bacteria." This project has a target of 2016-2017 for potential adoption of new water quality objectives. Water Board staff will present several components on this item: 1) a status update on this project and the State Board's bacteria objectives project, 2) a review of the data collected in our region (Enclosure 1), and 3) questions to consider in developing the next steps for our project.

BACKGROUND: The Lahontan Basin Plan contains the most restrictive bacteria water quality objectives in the state. Enclosure 2 lists the different standards of each Regional Board.

The 1975 Water Quality Control Plan (Basin Plan) for the North Lahontan Basin applied the 20 fecal coliform per 100 mL water quality objective to ten water bodies. In the 1995 Basin Plan update, the Water Board extended the 20 fecal coliform per 100 mL objective to the entire Region. The State Water Board and USEPA subsequently approved these standards for the Lahontan region.

Since 1989, staff has been collecting and evaluating water quality samples for bacteria to assess ambient characteristics and follow up on reported exceedances of the standard. Exceedances of the bacteria objective for water bodies in the Bridgeport and Huntoon Valleys (Mono County) resulted in the listing of those waters on the federal 303(d) list as impaired by pathogens. The 2012 Bridgeport Grazing Waiver is currently addressing those bacteria impairments.

Over the past five years, staff has focused additional effort on collecting and evaluating more water quality samples to better characterize the region's waters, to understand the relationship of sources and other watershed influences, and to sample remote waters. Enclosure 3 is a staff report on the results of bacteria monitoring in 2011 on sites where rangeland livestock grazing is the predominant land use. This report is an example of a characterization of Eastern Sierra streams relative to a specific land use.

Before data are used in the evaluation, it must go through a rigorous internal quality control before it is uploaded into the publically-accessible database, CEDEN (California Environmental Data Exchange Network). Enclosure 1 is a compilation of the region's fecal coliform data from CEDEN, organized by hydrologic unit, beginning with data from 2000 through 2013.

As part of the 2012 Triennial Review list development and adoption, Water Board members, staff, and other stakeholders voiced concerns about the appropriateness of the existing 20 fecal coliform per 100 mL standard throughout the entire region. Evidence suggests the existing standard cannot be reasonably achieved in certain areas. However, many waters in the region meet the 20 fecal coliform per 100 mL standard. Because of these concerns, the Water Board directed staff to continue evaluating water quality samples, including relevant watershed and land use characteristics, and to present options to revise the existing bacteria water quality objective.

Following the 2012 Triennial Review, at least six members of the staff have spent significant portions of their time planning, collecting, evaluating, and documenting all aspects of the bacteria water quality objectives project. This effort has resulted in a robust dataset to begin the evaluation. Another significant part of the characterization is the microbial source tracking (MST) effort, which is a method to differentiate bacteria sources between human, wildlife, and ruminant (deer, horses, cattle). MST involves a "filter and freeze" process for later analysis. Frozen samples from water with relatively high bacteria present are sent to university researchers who analyze the bacteria genetic material. The MST analysis is an emerging science and is continually improving in differentiating sources of the bacteria. Preliminary MST results are expected not earlier than spring 2015.

While staff has been working on this high priority project, the State Water Board is proposing statewide bacteria objectives based on a USEPA recommendation (see Enclosure 4) to protect recreational users from the effects of pathogens in California water bodies. This use, REC-1 (water contact recreation), including uses such as swimming, recognizes the incidental ingestion of water. The Lahontan bacteria objective of 20 fecal coliform per 100 mL is intended to support all beneficial uses, including REC-1, and to be reasonably protective of the intentional ingestion of water. The concern is that a proposed statewide objective that is less stringent than the 20 fecal coliform objective would not provide the same level of protection to the user.

Lahontan Water Board staff is working with State Board staff to include an evaluation of the extensive bacteria data collected over the past years in the region.

DISCUSSION: The Lahontan Region includes over 700 lakes; 3,170 miles of streams; 15 major watersheds; and two federally-designated Outstanding National Resource Water—Lake Tahoe and Mono Lake. The region includes the entire eastern side of the Sierra Nevada mountain range, which is estimated to provide 60% of California's developed water supply. The natural quality of these high elevation waters, which are mostly derived from snowmelt, is exceptionally high and is expected to remain very high because of the lack of development and land uses in the high alpine areas.

Believing the high alpine water are of exceptionally high quality natural waters, many inhabitants (including disadvantaged communities) and recreationists in the eastern Sierras intentionally consume the surface water with little or no treatment. The states of California and Nevada have exempted municipal water purveyors at Lake Tahoe from required surface water microbial treatment because of the high quality water.

The consumption of untreated surface water does not come without health risk. In the absence of certain land uses, such as livestock grazing, the health risk is low with fecal bacteria originating from only wildlife sources. As the high quality surface waters travel down the watershed and through certain land uses, the risk increases as the water quality typically degrades from input of urban stormwater, agriculture, contact recreation, erosion of natural sources, etc. Characterizing the existing water quality across the region is critical to understanding if a bacteria water quality objective different than the regional 20 fecal coliform standard should be applied to certain locations. A less stringent water quality objective for bacteria in the Lahontan region would need full environmental documentation, including an anti-degradation analysis, and data to support the analysis.

Water Board staff will present an update of the sampling efforts to date. Recent bacteria sampling personnel and contractors include Board staff, SWAMP, UC Davis, and Sierra Nevada Aquatic Research Laboratory. As part of the presentation, staff will show the watersheds sampled and will give a preliminary evaluation of over 3,500 fecal coliform and E. coli samples in 124 locations in the eastern Sierras from 2008 through 2013, as well as over 2,400 historic fecal coliform samples prior to 2008. Staff will summarize personnel and contract resources used to date and will give a proposed schedule for further sampling and evaluations.

Of the 132 locations sampled, a preliminary evaluation of the data suggests several conclusions:

- a. Sixty-four locations in the region meet the existing 20 fecal coliform per 100 mL standard. The majority of locations in the Lake Tahoe watershed meet the standard.

- b. Sixty-eight locations do not meet the 20 fecal coliform per 100 mL standard. The majority of these locations have evidence of anthropogenic influences.
- c. When cattle have unrestricted access to surface waters, the fecal coliform concentrations are commonly in excess of 50 to 300+ fecal coliform colonies per 100 mL.

For developing the next steps in this project, two primary questions arise:

- 1. Are there some areas of our region that should be designated specifically for intentional consumption of un-treated or partially treated surface water where the existing 20 fecal coliform per 100 mL standard should be protected?
- 2. Are there certain areas in our region where the existing 20 fecal coliform per 100 mL standard (or its equivalent in E. coli concentration) should be relaxed?

**RECOMMEN-
DATION:**

No action requested, but staff requests the Water Board members give input and direction on the next steps for this project.

ENCLOSURES

ENCLOSURE	Description	Bates Pages
1	Compilation of bacteria data through 2013	6-7
2	Comparison of bacteria water quality objectives at the different Regional Boards	6-65
3	Bacteria Monitoring Report in the Eastern Sierra, Summary of Results for 2011, Staff Report	6-69
4	USEPA Recommended 2012 Recreational Water Quality Criteria	6-105
5	Powerpoint presentation on bacteria water quality objectives project by staff, Richard Booth	6-109
6	Powerpoint presentation on Lahontan region bacteria data by staff, Bruce Warden, PhD	6-123

ENCLOSURE 1

This page is intentionally left blank.

November 2014 Board meeting, Item #6, ENCLOSURE 1: Region 6 Fecal Coliform Data Summary

Lahontan staff evaluates bacteria data, including metadata such as land uses and elevation of the sampling locations, to guide the bacteria water quality objective revision project. Below are summaries of bacteria data gathered between 2000 and 2013. These data were used by staff to design the sampling effort for the 2014 field season.

All available fecal coliform data for Region 6 (Lahontan) were downloaded from the California Environmental Data Exchange Network (CEDEN) database. CEDEN has 3,542 individual samples that were collected from 2000 to 2013. Geomeans (also known as “log means”) are a statistical metric to smooth data variability. Geomeans were calculated for samples collected within each month. Staff assessed the values for exceedance of the Lahontan Basin Plan water quality objective of a geomean value of 20 fecal coliform per 100 mL. The data are categorized in the table below by anthropogenic influences and include the elevation of the sample site. The second table in this enclosure shows the monthly geomean bacteria data in greater detail.

Categories

- The “Reference/Background” sites are sites where bacteria sources, if any, are usually wildlife upstream of human and livestock influence.
- The “Reference/Background to moderate source” sites have a few anthropogenic sources, including recreation and grazing.
- The “Moderate Source/Dispersed Recreation” sites are located near sources of a mixture of dispersed recreational activities such as hiking, camping, backpacking, fishing, etc. somewhat more intensive than the “Reference/Background to moderate source” sites.
- The “Moderate to High Anthropogenic sources” sites are near grazing, urban, or other intensive human or livestock activity.
- The “High Anthropogenic Source – urban/grazing” sites are the highest intensity and proximity sources categorized.

These categories are based on field observations and institutional knowledge and are qualitative by their nature. Staff expects to refine these categories and the apparent relationship to bacteria concentrations, as the project progresses and as staff receive public input. For example, staff will likely further refine the categories after reviewing the field notebooks where samplers recorded pertinent observations (e.g., the presence of cows at the time of sampling).

Of the 132 locations sampled, a preliminary evaluation of the data suggests several conclusions:

- a. Sixty-four of 132 locations in the region meet the existing 20 fecal coliform per 100 mL standard. The majority of locations in the Lake Tahoe watershed meet the standard.
- b. Sixty-eight of 132 locations do not meet the 20 fecal coliform per 100 mL standard. The majority of these locations have evidence of anthropogenic influences.
- c. When cattle have unrestricted access to surface waters, the fecal coliform concentrations are commonly in excess of 50 to 300+ fecal coliform colonies per 100 mL.

Region 6 CEDEN Geomean Exceedance Frequency of 20 Fecal Coliform/100 mL Water Quality Objective

Station Name (within source type)	Exceedances of Geomean >20	No. of Samples	Elevation, feet
Reference / Background Sites: 84 geomeans, 19 sites, 0% Exceedence			
Lee Vining Cr below Camp Azusa	0	10	7,201
Cottonwood Cr at Horseshoe Meadow Road	0	10	9,600
Cottonwood Cr below Golden Trout Camp	0	1	10,194
Cottonwood Cr above confl w/ Windy Gap Tributary	0	1	10,197
Little Cottonwood Cr at Horseshoe Meadow Road	0	11	9,160
Windy Gap Tributary above confl w/ Cottonwood Cr	0	1	10,197
Crooked Cr at Deep Springs Cow Camp	0	1	9,347
Crooked Cr above Deep Springs Cow Camp	0	1	9,928
Amargosa R. at Upper Canyon	0	1	1,270
Mesquite Spring, nr Scotty's Castle DVNP	0	1	1,847
Eagle Cr lower reach	0	3	7,356
Virginia Cr, at Conway Summit	0	1	8,481
West Walker R. above confl w/ Little Walker R.	0	14	6,598
East Fork Carson R., above Wolf Cr	0	5	6,201
West Fork Carson R., above Forestdale Cr	0	4	7,575
General Cr, above Lily Pond	0	4	6,598
Upper Truckee River, Meiss Meadow, lower	0	2	8,363
Upper Truckee R., Meiss Meadow, upper	0	5	8,468
Bidwell Cr, below Mill Cr nr Fort Bidwell	0	8	4,898

Station Name (within source type)	Exceedances of Geomean >20	No. of samples	Elevation, feet
Reference/background to moderate source: 31 geomeans, 6 sites, 0% Exceedence			
Lone Pine Cr, at USGS gage	0	10	3,996
Lone Pine Cr, at Whitney Portal	0	7	7,789
Buckeye Cr, above Eagle Cr (abv campground)	0	1	7,182
General Creek, above campground	0	4	6,394
General Creek, above loop road	0	4	6,598
Upper Truckee River, above swim hole	0	5	8,468
Moderate source - dispersed recreation, etc.: 278 geomeans; 28 sites, 2% Exceedance			
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	0	9	7,175
Mammoth Cr, at Twin Lakes	0	5	8,579
Rock Cr, above diversion	0	37	7,398
Little Rock Res	0	4	3,363
Buckeye Cr below Campground	0	6	6,998
East Walker R. below Bridgeport Reservoir	0	15	6,394
Green Cr above Campground	0	1	7,995
Robinson Cr, below Barney Lake	0	1	8,205
West Walker R. above Pack Station	0	8	7,182
East Fork Carson R., above Hangman's bridge	1	5	5,604
East Fork Carson R., above bridge 31-13	0	5	6,010
East Fork Carson R., above Silver Cr	0	3	6,024
Hotsprings Cr above Grover Hotsprings Campground	1	28	5,837
Millberry Cr above house	0	17	5,804
Pleasant Valley Cr	1	5	5,817
West Fork Carson R. below Willow Cr	2	47	7,090
West Fork Carson R., at HWY 89 (Hope Valley)	0	1	5,180
West Fork Carson R. at Woodford's Bridge	1	29	5,600
West Fork Carson R. at Pickett's Bridge	0	9	7,034
West Fork Carson R., below Hope Valley Campground	0	4	7,139
West Fork Carson R., above Hope Valley Campground	0	4	7,156
General Cr, at Lake Tahoe	0	4	6,227
General Cr, above Hwy 89	0	4	6,257
Tallac Cr at Highway 89	0	23	6,362
Donner Cr, above Truckee R.	1	4	5,997
Cedar Cr, below Cedarville	0	3	4,636
Mill Cr, below Lake City	0	4	4,563
Mill Cr, abv Lake City	0	8	4,613

Station Name (within source type)	Exceedances of Geomean >20	No. of Samples	Elevation, feet
Moderate source to high anthropogenic sources: 236 geomeans, 23 sites, 16 % Exceedance			
Artesian Swimming Hole, South 1	0	3	4,124
Artesian Swimming Hole, North 1	0	3	4,124
Artesian Swimming Hole, North 2	0	3	4,134
South Fork Bishop Cr at Mumy Lane	1	10	4,390
North Fork Bishop Cr at Mumy Lane	0	10	4,386
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2	10	9,813
Horseshoe Meadow Cr at Trail Pass trail crossing	2	10	9,941
Round Valley Cr	2	10	9,918
Buckeye Cr above the campground	3	9	7,372
East Walker R., at CA/NV state line	3	52	5,997
Swauger Cr, above Huntoon Valley	2	6	7,208
Hot Cr above confl w/ Little Walker R.	4	8	6,998
Hotsprings Cr at Hotsprings Cr Road	2	26	5,797
Silver Cr, above East Fork Carson R.	0	4	5,945
Wolf Cr, above East Fork Carson R.	2	4	6,198
Wolf Cr, Below Ranch	2	3	6,398
Trout Cr at Highway 50	5	22	6,296
Upper Truckee R., at Hwy 50 Meyers	0	5	6,398
Upper Truckee R., at Grass Lake Rd.	1	5	6,565
Squaw Cr, above Truckee R.	0	4	5,997
Susan R. at Lassen St	0	3	4,252
Susan R., above confl w/ Willard Cr	3	11	4,800
Cedar Cr, abv Cedarville	5	15	4,806

Station Name (within source type)	Exceedances of Geomean >20	No. of Samples	Elevation, feet
High anthropogenic source - urban / grazing: 285 geomeans, 56 sites, 45% exceedance			
Bishop Cr Canal at East Line St	1	5	4,190
South Fork Bishop Cr at Brockman Lane	4	8	4,281
North Fork Bishop Cr at Brockman Lane	5	8	4,278
Hilton Cr, at Lake Crowley	8	44	6,814
Mammoth Cr Horsecamp	1	16	7,799
Mammoth Cr, at HWY 395	14	49	7,201
Mammoth Cr, at Old Mammoth Rd	1	5	7,828
Mammoth Cr Trib	2	5	8,360
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	5	34	7,178
Mammoth Cr above Horsecamp	4	25	7,848
Crooked Cr 1 mile below Deep Springs Cow Camp	1	1	9,199
Amargosa R. below Willow Cr	1	1	1,227
No. Branch Buckeye Cr, upstream bridge	18	49	6,752
Mid Branch Buckeye Cr, upstream bridge	19	38	6,493
East Walker R., at inlet to Bridgeport Reservoir	8	15	6,437
East Walker R., at Hwy 395	5	12	6,444
No. Branch Robinson Cr, upstream bridge	19	49	6,499
So. Branch Robinson Cr, upstream bridge	19	35	6,493
Swauger Cr, below Huntoon Valley	11	16	6,663
Virginia Cr, below Willow Springs (at USGS gage)	0	5	6,729
Virginia Cr below Green Cr Road	2	4	6,640
Little Walker R. above confl w/ West Walker R.	5	15	6,598
Little Walker R. above confl w/ Hot Cr	2	8	6,998
Little Walker R. at Hwy 108	3	6	6,923
Little Walker R. Below confl w/ Hot Cr	3	5	6,998
Sardine Cr below McKay Cr	2	9	6,998
Sardine Cr above McKay Cr	5	9	8,802
West Walker R., at Coleville	1	55	5,597
West Walker R. at Topaz	10	41	5,046
East Fork Carson, at USGS gage blw Markleeville	4	48	5,413
confl Millberry Cr w/ Markleeville Cr	16	28	5,509
Millberry Cr behind Post Office	5	8	5,492
Millberry Cr at 30 mph Sign	6	14	5,568
Markleeville Cr at USFS Campground	15	27	5,499
Markleeville Cr at Swim Hole	15	26	5,512
Markleeville Cr at Library Bridge	13	28	5,518
West Fork Carson R. at Paynesville Bridge	19	29	5,180
Tallac Cr at Baldwin Beach	6	23	6,243
Trout Cr confl South Upper Truckee	9	21	6,230

Station Name (within source type)	Exceedances of Geomean >20	No. of Samples	Elevation, feet
High anthropogenic source (Cont'd)			
Upper Truckee R., at Lake Tahoe	1	1	6,227
Upper Truckee R., at R. Dr.	0	5	6,296
Upper Truckee R., at Elks Club Dr.	0	5	6,385
Upper Truckee R., at bridge Hawley Grade	1	5	6,598
Truckee R., above TTSA	0	2	5,797
Truckee R., below Town of Truckee	0	4	5,797
Truckee R., above Squaw Cr	0	4	6,342
Truckee R., above Bear Cr	0	4	6,198
Truckee R., above R. Ranch	0	5	6,198
Brockman Slough at Center Road	3	4	4,199
Long Valley Cr, downstream	0	1	4,199
Long Valley Cr, upstream	1	8	4,596
Susan R. nr Litchfield	8	18	4,085
Susan R. at Leavitt Lane	1	4	4,098
Susan R. at Chappuis Lane	4	4	4,078
Susan R. at Johnsonville Road	2	3	4,199
Susan R. at Hwy 36	3	4	4,199

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Mono Hydrologic Unit 601					
Lee Vining Cr below Camp Azusa	2011	July	2	3	7,201
Lee Vining Cr below Camp Azusa	2011	August	2	3	7,201
Lee Vining Cr below Camp Azusa	2011	September	2	0	7,201
Lee Vining Cr below Camp Azusa	2011	November	1	0	7,201
Lee Vining Cr below Camp Azusa	2011	December	2	0	7,201
Lee Vining Cr below Camp Azusa	2012	June	1	0	7,201
Lee Vining Cr below Camp Azusa	2012	July	1	18	7,201
Lee Vining Cr below Camp Azusa	2012	August	2	1	7,201
Lee Vining Cr below Camp Azusa	2012	September	2	0	7,201
Lee Vining Cr below Camp Azusa	2012	October	1	2	7,201
Owens Hydrologic Unit 603					
Artesian Swimming Hole, South 1	2012	October	1	0	4,124
Artesian Swimming Hole, South 1	2013	April	1	0	4,124
Artesian Swimming Hole, South 1	2013	May	1	0	4,124
Artesian Swimming Hole, North 1	2012	October	1	1	4,124
Artesian Swimming Hole, North 1	2013	April	1	3	4,124
Artesian Swimming Hole, North 1	2013	May	1	5	4,124
Artesian Swimming Hole, North 2	2012	October	1	0	4,134
Artesian Swimming Hole, North 2	2013	April	1	13	4,134
Artesian Swimming Hole, North 2	2013	May	1	12	4,134
Bishop Cr Canal at East Line St	2010	March	1	15	4,190
Bishop Cr Canal at East Line St	2010	May	1	17	4,190
Bishop Cr Canal at East Line St	2010	September	1	11	4,190
Bishop Cr Canal at East Line St	2010	December	1	5	4,190
Bishop Cr Canal at East Line St	2011	September	1	115	4,190
South Fork Bishop Cr at Brockman Lane	2012	October	4	12	4,281
South Fork Bishop Cr at Brockman Lane	2012	November	1	6	4,281
South Fork Bishop Cr at Brockman Lane	2013	January	1	3	4,281
South Fork Bishop Cr at Brockman Lane	2013	February	1	1	4,281
South Fork Bishop Cr at Brockman Lane	2013	April	2	45	4,281
South Fork Bishop Cr at Brockman Lane	2013	June	1	56	4,281
South Fork Bishop Cr at Brockman Lane	2013	July	1	32	4,281

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
South Fork Bishop Cr at Brockman Lane	2013	August	1	37	4,281
South Fork Bishop Cr at Mumy Lane	2012	October	4	2	4,390
South Fork Bishop Cr at Mumy Lane	2012	November	1	3	4,390
South Fork Bishop Cr at Mumy Lane	2013	January	1	0	4,390
South Fork Bishop Cr at Mumy Lane	2013	February	1	0	4,390
South Fork Bishop Cr at Mumy Lane	2013	March	2	39	4,390
South Fork Bishop Cr at Mumy Lane	2013	April	2	1	4,390
South Fork Bishop Cr at Mumy Lane	2013	May	1	4	4,390
South Fork Bishop Cr at Mumy Lane	2013	June	1	4	4,390
South Fork Bishop Cr at Mumy Lane	2013	July	1	0	4,390
South Fork Bishop Cr at Mumy Lane	2013	August	1	0	4,390
North Fork Bishop Cr at Brockman Lane	2012	October	4	24	4,278
North Fork Bishop Cr at Brockman Lane	2012	November	1	11	4,278
North Fork Bishop Cr at Brockman Lane	2013	January	1	0	4,278
North Fork Bishop Cr at Brockman Lane	2013	February	1	2	4,278
North Fork Bishop Cr at Brockman Lane	2013	April	2	87	4,278
North Fork Bishop Cr at Brockman Lane	2013	June	1	116	4,278
North Fork Bishop Cr at Brockman Lane	2013	July	1	88	4,278
North Fork Bishop Cr at Brockman Lane	2013	August	1	36	4,278
North Fork Bishop Cr at Mumy Lane	2012	October	4	3	4,386
North Fork Bishop Cr at Mumy Lane	2012	November	1	0	4,386
North Fork Bishop Cr at Mumy Lane	2013	January	1	0	4,386
North Fork Bishop Cr at Mumy Lane	2013	February	1	4	4,386
North Fork Bishop Cr at Mumy Lane	2013	March	2	3	4,386
North Fork Bishop Cr at Mumy Lane	2013	April	2	2	4,386
North Fork Bishop Cr at Mumy Lane	2013	May	1	2	4,386
North Fork Bishop Cr at Mumy Lane	2013	June	1	2	4,386
North Fork Bishop Cr at Mumy Lane	2013	July	1	2	4,386
North Fork Bishop Cr at Mumy Lane	2013	August	1	0	4,386
Cottonwood Cr at Horseshoe Meadow Road	2011	July	2	3	9,600
Cottonwood Cr at Horseshoe Meadow Road	2011	October	1	0	9,600
Cottonwood Cr at Horseshoe Meadow Road	2012	May	2	0	9,600

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Cottonwood Cr at Horseshoe Meadow Road	2012	June	5	1	9,600
Cottonwood Cr at Horseshoe Meadow Road	2012	July	5	2	9,600
Cottonwood Cr at Horseshoe Meadow Road	2012	August	5	3	9,600
Cottonwood Cr at Horseshoe Meadow Road	2012	September	5	1	9,600
Cottonwood Cr at Horseshoe Meadow Road	2012	October	2	1	9,600
Cottonwood Cr at Horseshoe Meadow Road	2013	June	1	0	9,600
Cottonwood Cr at Horseshoe Meadow Road	2013	July	1	2	9,600
Cottonwood Cr below Golden Trout Camp	2011	July	2	6	10,194
Cottonwood Cr above confl w/ Windy Gap Tributary	2011	July	2	1	10,197
Hilton Cr, at Lake Crowley	2004	July	1	16	6,814
Hilton Cr, at Lake Crowley	2004	October	1	140	6,814
Hilton Cr, at Lake Crowley	2005	January	1	2	6,814
Hilton Cr, at Lake Crowley	2005	April	1	1	6,814
Hilton Cr, at Lake Crowley	2005	July	1	100	6,814
Hilton Cr, at Lake Crowley	2007	September	1	4	6,814
Hilton Cr, at Lake Crowley	2007	October	1	0	6,814
Hilton Cr, at Lake Crowley	2007	November	1	6	6,814
Hilton Cr, at Lake Crowley	2007	December	1	6	6,814
Hilton Cr, at Lake Crowley	2008	March	1	0	6,814
Hilton Cr, at Lake Crowley	2008	April	1	0	6,814
Hilton Cr, at Lake Crowley	2008	May	1	0	6,814
Hilton Cr, at Lake Crowley	2008	June	1	34	6,814
Hilton Cr, at Lake Crowley	2008	July	1	12	6,814
Hilton Cr, at Lake Crowley	2008	August	1	7	6,814
Hilton Cr, at Lake Crowley	2008	September	1	10	6,814
Hilton Cr, at Lake Crowley	2008	October	1	5	6,814
Hilton Cr, at Lake Crowley	2008	November	1	4	6,814
Hilton Cr, at Lake Crowley	2008	December	1	2	6,814
Hilton Cr, at Lake Crowley	2009	January	1	1	6,814
Hilton Cr, at Lake Crowley	2009	February	1	2	6,814
Hilton Cr, at Lake Crowley	2009	March	1	0	6,814
Hilton Cr, at Lake Crowley	2009	April	1	0	6,814

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Hilton Cr, at Lake Crowley	2009	May	1	4	6,814
Hilton Cr, at Lake Crowley	2009	June	1	14	6,814
Hilton Cr, at Lake Crowley	2009	July	1	30	6,814
Hilton Cr, at Lake Crowley	2009	August	1	12	6,814
Hilton Cr, at Lake Crowley	2009	September	1	6	6,814
Hilton Cr, at Lake Crowley	2009	October	1	20	6,814
Hilton Cr, at Lake Crowley	2009	November	1	5	6,814
Hilton Cr, at Lake Crowley	2009	December	1	3	6,814
Hilton Cr, at Lake Crowley	2010	January	1	0	6,814
Hilton Cr, at Lake Crowley	2010	February	1	35	6,814
Hilton Cr, at Lake Crowley	2010	March	1	0	6,814
Hilton Cr, at Lake Crowley	2010	May	2	5	6,814
Hilton Cr, at Lake Crowley	2010	June	1	0	6,814
Hilton Cr, at Lake Crowley	2010	July	1	40	6,814
Hilton Cr, at Lake Crowley	2010	August	1	152	6,814
Hilton Cr, at Lake Crowley	2010	September	1	10	6,814
Hilton Cr, at Lake Crowley	2010	October	1	62	6,814
Hilton Cr, at Lake Crowley	2010	November	1	10	6,814
Hilton Cr, at Lake Crowley	2011	January	1	3	6,814
Hilton Cr, at Lake Crowley	2011	March	1	2	6,814
Hilton Cr, at Lake Crowley	2011	April	1	2	6,814
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2011	July	3	1	9,813
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2011	August	1	2	9,813
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2011	September	10	23	9,813
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2011	October	10	4	9,813
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2012	May	2	5	9,813
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2012	June	7	3	9,813
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2012	July	11	1	9,813
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2012	August	12	71	9,941
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2012	September	12	3	9,813
Horseshoe Meadow Cr above confl w/ Round Valley Cr	2012	October	4	1	9,813
Horseshoe Meadow Cr at Trail Pass trail crossing	2011	July	3	2	9,941

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Horseshoe Meadow Cr at Trail Pass trail crossing	2011	August	1	14	9,941
Horseshoe Meadow Cr at Trail Pass trail crossing	2011	September	9	32	9,941
Horseshoe Meadow Cr at Trail Pass trail crossing	2011	October	10	8	9,941
Horseshoe Meadow Cr at Trail Pass trail crossing	2012	May	2	1	9,941
Horseshoe Meadow Cr at Trail Pass trail crossing	2012	June	12	1	9,941
Horseshoe Meadow Cr at Trail Pass trail crossing	2012	July	10	12	9,941
Horseshoe Meadow Cr at Trail Pass trail crossing	2012	August	10	23	9,941
Horseshoe Meadow Cr at Trail Pass trail crossing	2012	September	10	13	9,941
Horseshoe Meadow Cr at Trail Pass trail crossing	2012	October	4	4	9,941
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2008	February	1	1	7,175
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2008	March	1	0	7,175
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2008	April	1	0	7,175
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2008	May	1	1	7,175
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2008	June	1	4	7,175
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2008	October	1	0	7,175
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2008	November	1	0	7,175
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2009	March	1	0	7,175
Hot Cr abv confl w/ Mammoth Cr (nr Hot Cr Hatchery)	2009	May	1	0	7,175
Little Cottonwood Cr at Horseshoe Meadow Road	2011	July	2	1	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2011	August	1	2	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2011	September	5	1	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2011	October	4	1	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2012	May	2	0	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2012	June	6	1	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2012	July	5	1	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2012	August	5	4	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2012	September	5	1	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2012	October	2	1	9,160
Little Cottonwood Cr at Horseshoe Meadow Road	2013	June	1	0	9,160
Lone Pine Cr, at USGS gage	2008	July	1	3	3,996
Lone Pine Cr, at USGS gage	2008	August	1	0	3,996
Lone Pine Cr, at USGS gage	2009	March	1	2	3,996

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Lone Pine Cr, at USGS gage	2009	April	1	18	3,996
Lone Pine Cr, at USGS gage	2009	June	1	8	3,996
Lone Pine Cr, at USGS gage	2009	September	1	8	3,996
Lone Pine Cr, at USGS gage	2010	March	1	0	3,996
Lone Pine Cr, at USGS gage	2010	May	1	2	3,996
Lone Pine Cr, at USGS gage	2010	September	1	2	3,996
Lone Pine Cr, at USGS gage	2010	December	1	0	3,996
Lone Pine Cr, at Whitney Portal	2008	July	1	0	7,789
Lone Pine Cr, at Whitney Portal	2008	August	1	0	7,789
Lone Pine Cr, at Whitney Portal	2009	April	1	0	7,789
Lone Pine Cr, at Whitney Portal	2009	June	1	1	7,789
Lone Pine Cr, at Whitney Portal	2009	September	1	0	7,789
Lone Pine Cr, at Whitney Portal	2010	May	1	0	7,789
Lone Pine Cr, at Whitney Portal	2010	September	1	0	7,789
Mammoth Cr Horsecamp	2010	April	1	0	7,799
Mammoth Cr Horsecamp	2010	May	1	0	7,799
Mammoth Cr Horsecamp	2010	June	1	2	7,799
Mammoth Cr Horsecamp	2010	July	1	6	7,799
Mammoth Cr Horsecamp	2010	August	1	50	7,799
Mammoth Cr Horsecamp	2010	September	1	12	7,799
Mammoth Cr Horsecamp	2010	October	1	4	7,799
Mammoth Cr Horsecamp	2010	November	1	0	7,799
Mammoth Cr Horsecamp	2011	January	1	0	7,799
Mammoth Cr Horsecamp	2011	March	1	0	7,799
Mammoth Cr Horsecamp	2011	April	1	0	7,799
Mammoth Cr Horsecamp	2011	May	1	10	7,799
Mammoth Cr Horsecamp	2011	June	1	0	7,799
Mammoth Cr Horsecamp	2011	July	1	0	7,799
Mammoth Cr Horsecamp	2011	August	1	12	7,799
Mammoth Cr Horsecamp	2011	September	1	2	7,799
Mammoth Cr, at HWY 395	2004	July	1	79	7,201
Mammoth Cr, at HWY 395	2004	October	1	41	7,201

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Mammoth Cr, at HWY 395	2005	January	1	1	7,201
Mammoth Cr, at HWY 395	2005	April	1	1	7,201
Mammoth Cr, at HWY 395	2005	July	1	220	7,201
Mammoth Cr, at HWY 395	2007	September	1	42	7,201
Mammoth Cr, at HWY 395	2007	October	1	8	7,201
Mammoth Cr, at HWY 395	2007	November	1	2	7,201
Mammoth Cr, at HWY 395	2007	December	1	2	7,201
Mammoth Cr, at HWY 395	2008	February	1	0	7,201
Mammoth Cr, at HWY 395	2008	March	1	0	7,201
Mammoth Cr, at HWY 395	2008	April	1	0	7,201
Mammoth Cr, at HWY 395	2008	May	1	1	7,201
Mammoth Cr, at HWY 395	2008	June	1	20	7,201
Mammoth Cr, at HWY 395	2008	July	1	10	7,201
Mammoth Cr, at HWY 395	2008	August	1	66	7,201
Mammoth Cr, at HWY 395	2008	September	1	9	7,201
Mammoth Cr, at HWY 395	2008	October	1	4	7,201
Mammoth Cr, at HWY 395	2008	November	1	1	7,201
Mammoth Cr, at HWY 395	2009	January	1	0	7,201
Mammoth Cr, at HWY 395	2009	February	1	0	7,201
Mammoth Cr, at HWY 395	2009	March	1	1	7,201
Mammoth Cr, at HWY 395	2009	April	1	1	7,201
Mammoth Cr, at HWY 395	2009	May	1	5	7,201
Mammoth Cr, at HWY 395	2009	June	1	28	7,201
Mammoth Cr, at HWY 395	2009	July	1	154	7,201
Mammoth Cr, at HWY 395	2009	August	1	218	7,201
Mammoth Cr, at HWY 395	2009	September	1	10	7,201
Mammoth Cr, at HWY 395	2009	October	1	34	7,201
Mammoth Cr, at HWY 395	2009	November	1	1	7,201
Mammoth Cr, at HWY 395	2009	December	1	8	7,201
Mammoth Cr, at HWY 395	2010	February	1	0	7,201
Mammoth Cr, at HWY 395	2010	March	1	1	7,201
Mammoth Cr, at HWY 395	2010	April	1	3	7,201

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Mammoth Cr, at HWY 395	2010	May	1	12	7,201
Mammoth Cr, at HWY 395	2010	June	1	0	7,201
Mammoth Cr, at HWY 395	2010	July	1	26	7,201
Mammoth Cr, at HWY 395	2010	August	1	298	7,201
Mammoth Cr, at HWY 395	2010	September	1	3	7,201
Mammoth Cr, at HWY 395	2010	October	1	61	7,201
Mammoth Cr, at HWY 395	2010	November	1	8	7,201
Mammoth Cr, at HWY 395	2011	January	1	3	7,201
Mammoth Cr, at HWY 395	2011	March	1	0	7,201
Mammoth Cr, at HWY 395	2011	April	1	0	7,201
Mammoth Cr, at HWY 395	2011	May	1	4	7,201
Mammoth Cr, at HWY 395	2011	June	1	28	7,201
Mammoth Cr, at HWY 395	2011	July	1	5	7,201
Mammoth Cr, at HWY 395	2011	August	1	112	7,201
Mammoth Cr, at HWY 395	2011	September	1	8	7,201
Mammoth Cr, at Old Mammoth Rd	2004	July	1	44	7,828
Mammoth Cr, at Old Mammoth Rd	2004	October	1	7	7,828
Mammoth Cr, at Old Mammoth Rd	2005	January	1	1	7,828
Mammoth Cr, at Old Mammoth Rd	2005	April	1	1	7,828
Mammoth Cr, at Old Mammoth Rd	2005	July	1	14	7,828
Mammoth Cr, at Twin Lakes	2004	July	1	1	8,579
Mammoth Cr, at Twin Lakes	2004	October	1	1	8,579
Mammoth Cr, at Twin Lakes	2005	January	1	1	8,579
Mammoth Cr, at Twin Lakes	2005	April	1	1	8,579
Mammoth Cr, at Twin Lakes	2005	July	1	2	8,579
Mammoth Cr Trib	2004	July	1	53	8,360
Mammoth Cr Trib	2004	October	1	1	8,360
Mammoth Cr Trib	2005	January	1	1	8,360
Mammoth Cr Trib	2005	April	1	1	8,360
Mammoth Cr Trib	2005	July	1	56	8,360
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2008	February	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2008	March	1	0	7,178

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2008	April	1	1	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2008	May	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2008	June	1	10	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2008	October	1	1	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2008	November	1	5	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	March	1	1	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	May	1	4	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	June	1	16	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	July	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	August	1	4	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	September	1	13	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	October	1	4	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	November	1	1	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2009	December	1	6	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	February	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	March	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	April	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	May	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	June	1	5	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	July	1	28	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	August	1	86	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	September	1	2	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	October	1	6	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2010	November	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2011	January	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2011	March	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2011	April	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2011	May	1	0	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2011	June	1	386	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2011	July	1	45	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2011	August	1	150	7,178
Mammoth Cr abv confl w/ Hot Cr (nr Hot Cr Hatchery)	2011	September	1	12	7,178

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Mammoth Cr above Horsecamp	2009	June	1	8	7,848
Mammoth Cr above Horsecamp	2009	July	1	43	7,848
Mammoth Cr above Horsecamp	2009	August	1	35	7,848
Mammoth Cr above Horsecamp	2009	September	1	28	7,848
Mammoth Cr above Horsecamp	2009	October	1	2	7,848
Mammoth Cr above Horsecamp	2009	November	1	0	7,848
Mammoth Cr above Horsecamp	2009	December	1	0	7,848
Mammoth Cr above Horsecamp	2010	February	1	0	7,848
Mammoth Cr above Horsecamp	2010	March	1	1	7,848
Mammoth Cr above Horsecamp	2010	April	1	0	7,848
Mammoth Cr above Horsecamp	2010	May	1	0	7,848
Mammoth Cr above Horsecamp	2010	June	1	68	7,848
Mammoth Cr above Horsecamp	2010	July	1	14	7,848
Mammoth Cr above Horsecamp	2010	August	1	16	7,848
Mammoth Cr above Horsecamp	2010	September	1	0	7,848
Mammoth Cr above Horsecamp	2010	October	1	3	7,848
Mammoth Cr above Horsecamp	2010	November	1	0	7,848
Mammoth Cr above Horsecamp	2011	January	1	0	7,848
Mammoth Cr above Horsecamp	2011	March	1	0	7,848
Mammoth Cr above Horsecamp	2011	April	1	0	7,848
Mammoth Cr above Horsecamp	2011	May	1	0	7,848
Mammoth Cr above Horsecamp	2011	June	1	4	7,848
Mammoth Cr above Horsecamp	2011	July	1	0	7,848
Mammoth Cr above Horsecamp	2011	August	1	11	7,848
Mammoth Cr above Horsecamp	2011	September	1	10	7,848
Rock Cr, above diversion	2004	July	1	2	7,398
Rock Cr, above diversion	2004	October	1	5	7,398
Rock Cr, above diversion	2005	January	1	2	7,398
Rock Cr, above diversion	2005	April	1	1	7,398
Rock Cr, above diversion	2005	August	1	4	7,398
Rock Cr, above diversion	2007	September	1	0	7,398
Rock Cr, above diversion	2007	October	1	0	7,398

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Rock Cr, above diversion	2007	November	1	0	7,398
Rock Cr, above diversion	2007	December	1	0	7,398
Rock Cr, above diversion	2008	February	1	1	7,398
Rock Cr, above diversion	2008	March	1	4	7,398
Rock Cr, above diversion	2008	April	1	1	7,398
Rock Cr, above diversion	2008	May	1	0	7,398
Rock Cr, above diversion	2008	June	1	0	7,398
Rock Cr, above diversion	2008	July	1	2	7,398
Rock Cr, above diversion	2008	August	1	1	7,398
Rock Cr, above diversion	2008	September	1	2	7,398
Rock Cr, above diversion	2008	October	1	0	7,398
Rock Cr, above diversion	2008	November	1	0	7,398
Rock Cr, above diversion	2009	January	1	0	7,398
Rock Cr, above diversion	2009	February	1	0	7,398
Rock Cr, above diversion	2009	March	1	0	7,398
Rock Cr, above diversion	2009	April	1	0	7,398
Rock Cr, above diversion	2009	May	1	0	7,398
Rock Cr, above diversion	2009	June	1	3	7,398
Rock Cr, above diversion	2009	July	1	0	7,398
Rock Cr, above diversion	2009	August	1	0	7,398
Rock Cr, above diversion	2009	September	1	0	7,398
Rock Cr, above diversion	2009	October	1	1	7,398
Rock Cr, above diversion	2009	November	1	1	7,398
Rock Cr, above diversion	2009	December	1	10	7,398
Rock Cr, above diversion	2010	January	1	0	7,398
Rock Cr, above diversion	2010	May	1	0	7,398
Rock Cr, above diversion	2010	July	1	1	7,398
Rock Cr, above diversion	2010	October	1	1	7,398
Rock Cr, above diversion	2011	March	1	0	7,398
Rock Cr, above diversion	2011	April	1	0	7,398
Round Valley Cr	2011	July	3	1	9,918
Round Valley Cr	2011	August	1	2	9,918

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Round Valley Cr	2011	September	5	47	9,918
Round Valley Cr	2011	October	5	6	9,918
Round Valley Cr	2012	May	2	0	9,918
Round Valley Cr	2012	June	6	1	9,918
Round Valley Cr	2012	July	5	1	9,918
Round Valley Cr	2012	August	5	118	9,918
Round Valley Cr	2012	September	5	10	9,918
Round Valley Cr	2012	October	2	3	9,918
Windy Gap Tributary above confl w/ Cottonwood Cr	2011	July	2	2	10,197
Deep Springs Hydrologic Unit 605					
Crooked Cr 1 mile below Deep Springs Cow Camp	2011	August	2	308	9,199
Crooked Cr at Deep Springs Cow Camp	2011	August	2	1	9,347
Crooked Cr above Deep Springs Cow Camp	2011	August	1	0	9,928
Amargosa Hydrologic Unit 609					
Amargosa R. below Willow Cr	2004	March	1	65	1,227
Amargosa R. at Upper Canyon	2004	March	1	11	1,270
Mesquite Spring, nr Scotty's Castle DVNP	2002	October	1	1	1,847
Mesquite Spring, nr Scotty's Castle DVNP	2003	March	1	1	3,363
Antelope Hydrologic Unit 626					
Little Rock Res	2001	October	1	15	3,363
Little Rock Res	2002	May	1	3	3,363
Little Rock Res	2002	October	1	2	3,363
Little Rock Res	2003	March	1	6	3,363
East Walker R. Hydrologic Unit 630					
Buckeye Cr, above Eagle Cr (abv campground)	2002	June	1	1	7,182
No. Branch Buckeye Cr, upstream bridge	2007	August	2	182	6,752
No. Branch Buckeye Cr, upstream bridge	2007	September	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2007	October	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2007	November	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2007	December	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2008	January	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2008	March	1	0	6,752

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
No. Branch Buckeye Cr, upstream bridge	2008	April	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2008	May	1	2	6,752
No. Branch Buckeye Cr, upstream bridge	2008	June	2	338	6,752
No. Branch Buckeye Cr, upstream bridge	2008	July	1	230	6,752
No. Branch Buckeye Cr, upstream bridge	2008	August	1	1180	6,752
No. Branch Buckeye Cr, upstream bridge	2008	September	1	300	6,752
No. Branch Buckeye Cr, upstream bridge	2008	October	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2008	November	1	12	6,752
No. Branch Buckeye Cr, upstream bridge	2009	January	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2009	February	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2009	March	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2009	April	2	1	6,752
No. Branch Buckeye Cr, upstream bridge	2009	May	1	61	6,752
No. Branch Buckeye Cr, upstream bridge	2009	June	2	50	6,752
No. Branch Buckeye Cr, upstream bridge	2009	July	1	340	6,752
No. Branch Buckeye Cr, upstream bridge	2009	August	1	130	6,752
No. Branch Buckeye Cr, upstream bridge	2009	September	1	10	6,752
No. Branch Buckeye Cr, upstream bridge	2009	October	1	10	6,752
No. Branch Buckeye Cr, upstream bridge	2009	November	1	6	6,752
No. Branch Buckeye Cr, upstream bridge	2009	December	1	2	6,752
No. Branch Buckeye Cr, upstream bridge	2010	January	1	2	6,752
No. Branch Buckeye Cr, upstream bridge	2010	February	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2010	March	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2010	April	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2010	May	1	16	6,752
No. Branch Buckeye Cr, upstream bridge	2010	June	1	110	6,752
No. Branch Buckeye Cr, upstream bridge	2010	July	1	860	6,752
No. Branch Buckeye Cr, upstream bridge	2010	August	1	110	6,752
No. Branch Buckeye Cr, upstream bridge	2010	September	1	90	6,752
No. Branch Buckeye Cr, upstream bridge	2010	October	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2010	November	1	0	6,752
No. Branch Buckeye Cr, upstream bridge	2011	March	1	0	6,752

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
No. Branch Buckeye Cr, upstream bridge	2011	April	1	2	6,752
No. Branch Buckeye Cr, upstream bridge	2011	May	1	20	6,752
No. Branch Buckeye Cr, upstream bridge	2011	June	1	325	6,752
No. Branch Buckeye Cr, upstream bridge	2011	July	1	310	6,752
No. Branch Buckeye Cr, upstream bridge	2011	August	1	210	6,752
No. Branch Buckeye Cr, upstream bridge	2011	September	1	122	6,752
No. Branch Buckeye Cr, upstream bridge	2011	October	2	40	6,752
No. Branch Buckeye Cr, upstream bridge	2011	December	1	3	6,752
No. Branch Buckeye Cr, upstream bridge	2008	March	1	0	6,493
No. Branch Buckeye Cr, upstream bridge	2008	April	1	0	6,493
Mid Branch Buckeye Cr, upstream bridge	2008	May	1	0	6,493
Mid Branch Buckeye Cr, upstream bridge	2008	June	2	185	6,493
Mid Branch Buckeye Cr, upstream bridge	2008	July	1	70	6,493
Mid Branch Buckeye Cr, upstream bridge	2008	August	1	670	6,493
Mid Branch Buckeye Cr, upstream bridge	2008	September	1	1010	6,493
Mid Branch Buckeye Cr, upstream bridge	2008	October	1	6	6,493
Mid Branch Buckeye Cr, upstream bridge	2008	November	1	4	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	January	1	2	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	February	1	1	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	March	1	1	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	April	2	3	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	May	1	46	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	June	2	265	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	July	1	250	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	August	1	30	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	September	1	90	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	October	1	0	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	November	1	40	6,493
Mid Branch Buckeye Cr, upstream bridge	2009	December	1	4	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	February	1	1	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	March	1	1	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	April	1	0	6,493

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Mid Branch Buckeye Cr, upstream bridge	2010	May	1	6	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	June	1	50	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	July	1	180	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	August	1	60	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	September	1	70	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	October	1	12	6,493
Mid Branch Buckeye Cr, upstream bridge	2010	November	1	2	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	March	1	2	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	April	1	0	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	May	1	0	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	June	1	375	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	July	1	330	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	August	1	120	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	September	1	250	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	October	2	92	6,493
Mid Branch Buckeye Cr, upstream bridge	2011	December	1	2	6,493
Buckeye Cr above the campground	2011	August	5	25	7,372
Buckeye Cr above the campground	2011	September	4	15	7,372
Buckeye Cr above the campground	2011	October	5	3	7,372
Buckeye Cr above the campground	2012	May	4	1	7,372
Buckeye Cr above the campground	2012	June	5	2	7,372
Buckeye Cr above the campground	2012	July	2	21	7,372
Buckeye Cr above the campground	2012	August	4	32	7,372
Buckeye Cr above the campground	2012	September	6	14	7,372
Buckeye Cr above the campground	2012	October	4	3	7,372
Buckeye Cr below Campground	2012	May	4	2	6,998
Buckeye Cr below Campground	2012	June	5	4	6,998
Buckeye Cr below Campground	2012	July	2	15	6,998
Buckeye Cr below Campground	2012	August	4	20	6,998
Buckeye Cr below Campground	2012	September	6	15	6,998
Buckeye Cr below Campground	2012	October	4	10	6,998
Eagle Cr lower reach	2011	August	1	19	7,356

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Eagle Cr lower reach	2011	September	4	7	7,356
Eagle Cr lower reach	2011	October	5	1	7,356
East Walker R., at CA/NV state line	2003	November	1	6	5,997
East Walker R., at CA/NV state line	2004	February	1	2	5,997
East Walker R., at CA/NV state line	2004	August	1	1	5,997
East Walker R., at CA/NV state line	2004	November	1	1	5,997
East Walker R., at CA/NV state line	2005	February	1	1	5,997
East Walker R., at CA/NV state line	2005	June	1	4	5,997
East Walker R., at CA/NV state line	2007	August	1	20	5,997
East Walker R., at CA/NV state line	2007	September	1	0	5,997
East Walker R., at CA/NV state line	2007	October	1	3	5,997
East Walker R., at CA/NV state line	2007	November	1	0	5,997
East Walker R., at CA/NV state line	2007	December	1	0	5,997
East Walker R., at CA/NV state line	2008	January	1	0	5,997
East Walker R., at CA/NV state line	2008	February	1	0	5,997
East Walker R., at CA/NV state line	2008	March	1	0	5,997
East Walker R., at CA/NV state line	2008	April	1	0	5,997
East Walker R., at CA/NV state line	2008	May	1	1	5,997
East Walker R., at CA/NV state line	2008	June	1	1	5,997
East Walker R., at CA/NV state line	2008	July	1	7	5,997
East Walker R., at CA/NV state line	2008	August	1	8	5,997
East Walker R., at CA/NV state line	2008	September	1	2	5,997
East Walker R., at CA/NV state line	2008	October	1	1	5,997
East Walker R., at CA/NV state line	2008	November	1	0	5,997
East Walker R., at CA/NV state line	2009	January	1	2	5,997
East Walker R., at CA/NV state line	2009	February	1	0	5,997
East Walker R., at CA/NV state line	2009	March	1	0	5,997
East Walker R., at CA/NV state line	2009	April	1	0	5,997
East Walker R., at CA/NV state line	2009	May	1	6	5,997
East Walker R., at CA/NV state line	2009	June	1	5	5,997
East Walker R., at CA/NV state line	2009	July	1	20	5,997
East Walker R., at CA/NV state line	2009	August	1	14	5,997

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
East Walker R., at CA/NV state line	2009	September	1	12	5,997
East Walker R., at CA/NV state line	2009	October	1	6	5,997
East Walker R., at CA/NV state line	2009	November	1	0	5,997
East Walker R., at CA/NV state line	2009	December	1	0	5,997
East Walker R., at CA/NV state line	2010	January	1	0	5,997
East Walker R., at CA/NV state line	2010	February	1	0	5,997
East Walker R., at CA/NV state line	2010	March	1	0	5,997
East Walker R., at CA/NV state line	2010	April	1	1	5,997
East Walker R., at CA/NV state line	2010	May	1	4	5,997
East Walker R., at CA/NV state line	2010	June	1	16	5,997
East Walker R., at CA/NV state line	2010	July	1	4	5,997
East Walker R., at CA/NV state line	2010	August	1	2	5,997
East Walker R., at CA/NV state line	2010	September	1	2	5,997
East Walker R., at CA/NV state line	2010	October	1	0	5,997
East Walker R., at CA/NV state line	2010	November	1	1	5,997
East Walker R., at CA/NV state line	2011	January	1	14	5,997
East Walker R., at CA/NV state line	2011	March	1	0	5,997
East Walker R., at CA/NV state line	2011	April	1	0	5,997
East Walker R., at CA/NV state line	2011	May	1	4	5,997
East Walker R., at CA/NV state line	2011	June	1	122	5,997
East Walker R., at CA/NV state line	2011	July	1	25	5,997
East Walker R., at CA/NV state line	2011	August	1	85	5,997
East Walker R. below Bridgeport Reservoir	2000	April	1	1	6,394
East Walker R. below Bridgeport Reservoir	2000	May	1	2	6,394
East Walker R. below Bridgeport Reservoir	2000	June	1	1	6,394
East Walker R. below Bridgeport Reservoir	2000	July	1	2	6,394
East Walker R. below Bridgeport Reservoir	2000	August	1	1	6,394
East Walker R. below Bridgeport Reservoir	2000	September	1	1	6,394
East Walker R. below Bridgeport Reservoir	2000	October	1	1	6,394
East Walker R. below Bridgeport Reservoir	2000	November	1	1	6,394
East Walker R. below Bridgeport Reservoir	2000	December	1	1	6,394
East Walker R. below Bridgeport Reservoir	2001	January	1	1	6,394

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
East Walker R. below Bridgeport Reservoir	2001	February	1	1	6,394
East Walker R. below Bridgeport Reservoir	2001	March	1	1	6,394
East Walker R. below Bridgeport Reservoir	2001	April	1	1	6,394
East Walker R. below Bridgeport Reservoir	2001	May	1	1	6,394
East Walker R. below Bridgeport Reservoir	2001	June	1	1	6,394
East Walker R., at inlet to Bridgeport Reservoir	2000	April	1	3	6,437
East Walker R., at inlet to Bridgeport Reservoir	2000	May	1	82	6,437
East Walker R., at inlet to Bridgeport Reservoir	2000	June	3	297	6,437
East Walker R., at inlet to Bridgeport Reservoir	2000	July	1	170	6,437
East Walker R., at inlet to Bridgeport Reservoir	2000	August	1	130	6,437
East Walker R., at inlet to Bridgeport Reservoir	2000	September	1	93	6,437
East Walker R., at inlet to Bridgeport Reservoir	2000	October	1	210	6,437
East Walker R., at inlet to Bridgeport Reservoir	2000	November	1	10	6,437
East Walker R., at inlet to Bridgeport Reservoir	2000	December	1	4	6,437
East Walker R., at inlet to Bridgeport Reservoir	2001	January	1	3	6,437
East Walker R., at inlet to Bridgeport Reservoir	2001	February	1	2	6,437
East Walker R., at inlet to Bridgeport Reservoir	2001	March	1	2	6,437
East Walker R., at inlet to Bridgeport Reservoir	2001	April	1	8	6,437
East Walker R., at inlet to Bridgeport Reservoir	2001	May	1	63	6,437
East Walker R., at inlet to Bridgeport Reservoir	2001	June	1	170	6,437
East Walker R., at Hwy 395	2010	October	1	10	6,444
East Walker R., at Hwy 395	2010	November	1	12	6,444
East Walker R., at Hwy 395	2011	January	1	2	6,444
East Walker R., at Hwy 395	2011	March	1	2	6,444
East Walker R., at Hwy 395	2011	April	1	0	6,444
East Walker R., at Hwy 395	2011	May	1	68	6,444
East Walker R., at Hwy 395	2011	June	1	515	6,444
East Walker R., at Hwy 395	2011	July	3	433	6,444
East Walker R., at Hwy 395	2011	August	3	315	6,444
East Walker R., at Hwy 395	2011	September	5	161	6,444
East Walker R., at Hwy 395	2011	October	3	17	6,444
East Walker R., at Hwy 395	2011	December	2	1	6,444

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Green Cr above Campground	2002	June	1	1	7,995
Robinson Cr, below Barney Lake	2002	June	1	1	8,205
No. Branch Robinson Cr, upstream bridge	2007	August	2	304	6,499
No. Branch Robinson Cr, upstream bridge	2007	September	1	30	6,499
No. Branch Robinson Cr, upstream bridge	2007	October	1	8	6,499
No. Branch Robinson Cr, upstream bridge	2007	November	1	4	6,499
No. Branch Robinson Cr, upstream bridge	2007	December	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2008	January	1	2	6,499
No. Branch Robinson Cr, upstream bridge	2008	February	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2008	March	1	1	6,499
No. Branch Robinson Cr, upstream bridge	2008	April	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2008	May	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2008	June	2	45	6,499
No. Branch Robinson Cr, upstream bridge	2008	July	1	92	6,499
No. Branch Robinson Cr, upstream bridge	2008	August	1	180	6,499
No. Branch Robinson Cr, upstream bridge	2008	September	1	25	6,499
No. Branch Robinson Cr, upstream bridge	2008	October	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2008	November	1	2	6,499
No. Branch Robinson Cr, upstream bridge	2009	January	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2009	February	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2009	March	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2009	April	2	14	6,499
No. Branch Robinson Cr, upstream bridge	2009	May	1	142	6,499
No. Branch Robinson Cr, upstream bridge	2009	June	2	81	6,499
No. Branch Robinson Cr, upstream bridge	2009	July	1	130	6,499
No. Branch Robinson Cr, upstream bridge	2009	August	1	200	6,499
No. Branch Robinson Cr, upstream bridge	2009	September	1	90	6,499
No. Branch Robinson Cr, upstream bridge	2009	October	1	390	6,499
No. Branch Robinson Cr, upstream bridge	2009	November	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2009	December	1	16	6,499
No. Branch Robinson Cr, upstream bridge	2010	January	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2010	February	1	0	6,499

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
No. Branch Robinson Cr, upstream bridge	2010	March	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2010	April	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2010	May	1	18	6,499
No. Branch Robinson Cr, upstream bridge	2010	June	1	170	6,499
No. Branch Robinson Cr, upstream bridge	2010	July	1	20	6,499
No. Branch Robinson Cr, upstream bridge	2010	August	1	250	6,499
No. Branch Robinson Cr, upstream bridge	2010	September	1	20	6,499
No. Branch Robinson Cr, upstream bridge	2010	October	1	16	6,499
No. Branch Robinson Cr, upstream bridge	2010	November	1	8	6,499
No. Branch Robinson Cr, upstream bridge	2011	January	1	3	6,499
No. Branch Robinson Cr, upstream bridge	2011	March	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2011	April	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2011	May	1	0	6,499
No. Branch Robinson Cr, upstream bridge	2011	June	1	70	6,499
No. Branch Robinson Cr, upstream bridge	2011	July	1	280	6,499
No. Branch Robinson Cr, upstream bridge	2011	August	1	80	6,499
No. Branch Robinson Cr, upstream bridge	2011	September	1	485	6,499
No. Branch Robinson Cr, upstream bridge	2011	October	2	118	6,499
No. Branch Robinson Cr, upstream bridge	2011	December	1	3	6,499
So. Branch Robinson Cr, upstream bridge	2008	March	1	0	6,493
So. Branch Robinson Cr, upstream bridge	2008	June	1	12	6,493
So. Branch Robinson Cr, upstream bridge	2008	July	1	168	6,493
So. Branch Robinson Cr, upstream bridge	2009	January	1	1	6,493
So. Branch Robinson Cr, upstream bridge	2009	February	1	4	6,493
So. Branch Robinson Cr, upstream bridge	2009	March	1	0	6,493
So. Branch Robinson Cr, upstream bridge	2009	April	2	50	6,493
So. Branch Robinson Cr, upstream bridge	2009	May	1	123	6,493
So. Branch Robinson Cr, upstream bridge	2009	June	2	187	6,493
So. Branch Robinson Cr, upstream bridge	2009	July	1	140	6,493
So. Branch Robinson Cr, upstream bridge	2009	August	1	600	6,493
So. Branch Robinson Cr, upstream bridge	2009	September	1	150	6,493
So. Branch Robinson Cr, upstream bridge	2009	October	1	550	6,493

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
So. Branch Robinson Cr, upstream bridge	2009	November	1	0	6,493
So. Branch Robinson Cr, upstream bridge	2009	December	1	30	6,493
So. Branch Robinson Cr, upstream bridge	2010	January	1	0	6,493
So. Branch Robinson Cr, upstream bridge	2010	February	1	0	6,493
So. Branch Robinson Cr, upstream bridge	2010	March	1	0	6,493
So. Branch Robinson Cr, upstream bridge	2010	April	1	0	6,493
So. Branch Robinson Cr, upstream bridge	2010	May	1	52	6,493
So. Branch Robinson Cr, upstream bridge	2010	June	1	150	6,493
So. Branch Robinson Cr, upstream bridge	2010	July	1	20	6,493
So. Branch Robinson Cr, upstream bridge	2010	August	1	340	6,493
So. Branch Robinson Cr, upstream bridge	2010	September	1	850	6,493
So. Branch Robinson Cr, upstream bridge	2010	October	1	20	6,493
So. Branch Robinson Cr, upstream bridge	2010	November	1	8	6,493
So. Branch Robinson Cr, upstream bridge	2011	March	1	2	6,493
So. Branch Robinson Cr, upstream bridge	2011	April	1	291	6,493
So. Branch Robinson Cr, upstream bridge	2011	May	1	0	6,493
So. Branch Robinson Cr, upstream bridge	2011	June	1	40	6,493
So. Branch Robinson Cr, upstream bridge	2011	July	1	130	6,493
So. Branch Robinson Cr, upstream bridge	2011	August	1	170	6,493
So. Branch Robinson Cr, upstream bridge	2011	September	1	165	6,493
So. Branch Robinson Cr, upstream bridge	2011	October	2	141	6,493
So. Branch Robinson Cr, upstream bridge	2011	December	1	2	6,493
Swauger Cr, below Huntoon Valley	2010	June	1	550	6,663
Swauger Cr, below Huntoon Valley	2010	July	1	50	6,663
Swauger Cr, below Huntoon Valley	2010	August	1	200	6,663
Swauger Cr, below Huntoon Valley	2010	September	1	80	6,663
Swauger Cr, below Huntoon Valley	2010	October	1	40	6,663
Swauger Cr, below Huntoon Valley	2010	November	1	24	6,663
Swauger Cr, below Huntoon Valley	2011	March	1	3	6,663
Swauger Cr, below Huntoon Valley	2011	April	1	18	6,663
Swauger Cr, below Huntoon Valley	2011	May	1	3	6,663
Swauger Cr, below Huntoon Valley	2011	June	1	200	6,663

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Swauger Cr, below Huntoon Valley	2011	July	5	370	6,663
Swauger Cr, below Huntoon Valley	2011	August	5	290	6,663
Swauger Cr, below Huntoon Valley	2011	September	2	308	6,663
Swauger Cr, below Huntoon Valley	2011	October	1	610	6,663
Swauger Cr, below Huntoon Valley	2011	November	1	6	6,663
Swauger Cr, below Huntoon Valley	2011	December	2	15	6,663
Swauger Cr, above Huntoon Valley	2011	July	2	6	7,208
Swauger Cr, above Huntoon Valley	2011	August	5	34	7,208
Swauger Cr, above Huntoon Valley	2011	September	2	34	7,208
Swauger Cr, above Huntoon Valley	2011	October	1	7	7,208
Swauger Cr, above Huntoon Valley	2011	November	1	3	7,208
Swauger Cr, above Huntoon Valley	2011	December	2	1	7,208
Virginia Cr, at Conway Summit	2002	June	1	1	8,481
Virginia Cr, below Willow Springs (at USGS gage)	2011	July	1	12	6,729
Virginia Cr, below Willow Springs (at USGS gage)	2011	August	2	14	6,729
Virginia Cr, below Willow Springs (at USGS gage)	2011	September	1	1	6,729
Virginia Cr, below Willow Springs (at USGS gage)	2011	November	1	1	6,729
Virginia Cr, below Willow Springs (at USGS gage)	2011	December	2	0	6,729
Virginia Cr below Green Cr Road	2012	September	1	900	6,640
Virginia Cr below Green Cr Road	2013	September	1	16	6,640
Virginia Cr below Green Cr Road	2013	October	1	34	6,640
Virginia Cr below Green Cr Road	2013	November	1	1	6,640
West Walker R. Hydrologic Unit 631					
Hot Cr above confl w/ Little Walker R.	2010	October	1	50	6,998
Hot Cr above confl w/ Little Walker R.	2011	January	1	3	6,998
Hot Cr above confl w/ Little Walker R.	2011	April	1	0	6,998
Hot Cr above confl w/ Little Walker R.	2011	May	1	5	6,998
Hot Cr above confl w/ Little Walker R.	2011	June	1	12	6,998
Hot Cr above confl w/ Little Walker R.	2011	July	1	485	6,998
Hot Cr above confl w/ Little Walker R.	2011	August	1	50	6,998
Hot Cr above confl w/ Little Walker R.	2011	September	1	615	6,998
Little Walker R. above confl w/ West Walker R.	2008	May	1	0	6,598

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Little Walker R. above confl w/ West Walker R.	2008	June	1	15	6,598
Little Walker R. above confl w/ West Walker R.	2008	August	1	1	6,598
Little Walker R. above confl w/ West Walker R.	2008	September	1	1	6,598
Little Walker R. above confl w/ West Walker R.	2008	October	1	0	6,598
Little Walker R. above confl w/ West Walker R.	2008	November	1	0	6,598
Little Walker R. above confl w/ West Walker R.	2008	December	1	1	6,598
Little Walker R. above confl w/ West Walker R.	2010	October	1	30	6,598
Little Walker R. above confl w/ West Walker R.	2011	January	1	0	6,598
Little Walker R. above confl w/ West Walker R.	2011	April	1	0	6,598
Little Walker R. above confl w/ West Walker R.	2011	May	1	0	6,598
Little Walker R. above confl w/ West Walker R.	2011	June	1	30	6,598
Little Walker R. above confl w/ West Walker R.	2011	July	1	73	6,598
Little Walker R. above confl w/ West Walker R.	2011	August	1	26	6,598
Little Walker R. above confl w/ West Walker R.	2011	September	1	37	6,598
Little Walker R. above confl w/ Hot Cr	2010	October	1	10	6,998
Little Walker R. above confl w/ Hot Cr	2011	January	1	1	6,998
Little Walker R. above confl w/ Hot Cr	2011	April	1	0	6,998
Little Walker R. above confl w/ Hot Cr	2011	May	1	0	6,998
Little Walker R. above confl w/ Hot Cr	2011	June	1	6	6,998
Little Walker R. above confl w/ Hot Cr	2011	July	1	66	6,998
Little Walker R. above confl w/ Hot Cr	2011	August	1	16	6,998
Little Walker R. above confl w/ Hot Cr	2011	September	1	525	6,998
Little Walker R. at Hwy 108	2012	October	4	118	6,923
Little Walker R. at Hwy 108	2012	November	4	38	6,923
Little Walker R. at Hwy 108	2012	December	1	10	6,923
Little Walker R. at Hwy 108	2013	March	1	0	6,923
Little Walker R. at Hwy 108	2013	June	1	0	6,923
Little Walker R. at Hwy 108	2013	September	2	310	6,923
Little Walker R. Below confl w/ Hot Cr	2012	October	3	241	6,998
Little Walker R. Below confl w/ Hot Cr	2012	November	4	131	6,998
Little Walker R. Below confl w/ Hot Cr	2012	December	1	7	6,998
Little Walker R. Below confl w/ Hot Cr	2013	June	1	3	6,998

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Little Walker R. Below confl w/ Hot Cr	2013	September	1	800	6,998
Sardine Cr below McKay Cr	2011	August	5	8	6,998
Sardine Cr below McKay Cr	2011	September	5	12	6,998
Sardine Cr below McKay Cr	2011	October	3	3	6,998
Sardine Cr below McKay Cr	2012	May	5	0	6,998
Sardine Cr below McKay Cr	2012	June	5	0	6,998
Sardine Cr below McKay Cr	2012	July	3	5	6,998
Sardine Cr below McKay Cr	2012	August	5	33	6,998
Sardine Cr below McKay Cr	2012	September	6	35	6,998
Sardine Cr below McKay Cr	2012	October	4	8	6,998
Sardine Cr above McKay Cr	2011	August	5	16	8,802
Sardine Cr above McKay Cr	2011	September	5	26	8,802
Sardine Cr above McKay Cr	2011	October	3	5	8,802
Sardine Cr above McKay Cr	2012	May	5	0	8,802
Sardine Cr above McKay Cr	2012	June	5	1	8,802
Sardine Cr above McKay Cr	2012	July	3	23	8,802
Sardine Cr above McKay Cr	2012	August	5	195	8,802
Sardine Cr above McKay Cr	2012	September	6	159	8,802
Sardine Cr above McKay Cr	2012	October	4	56	8,802
West Walker R., at Coleville	2003	November	1	1	5,597
West Walker R., at Coleville	2004	February	1	1	5,597
West Walker R., at Coleville	2004	May	1	1	5,597
West Walker R., at Coleville	2004	August	1	240	5,597
West Walker R., at Coleville	2004	November	1	5	5,597
West Walker R., at Coleville	2005	February	1	1	5,597
West Walker R., at Coleville	2005	May	1	4	5,597
West Walker R., at Coleville	2007	August	1	0	5,597
West Walker R., at Coleville	2007	September	1	0	5,597
West Walker R., at Coleville	2007	October	1	0	5,597
West Walker R., at Coleville	2007	November	1	0	5,597
West Walker R., at Coleville	2007	December	1	0	5,597
West Walker R., at Coleville	2008	January	1	0	5,597

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
West Walker R., at Coleville	2008	February	1	0	5,597
West Walker R., at Coleville	2008	March	1	0	5,597
West Walker R., at Coleville	2008	April	1	0	5,597
West Walker R., at Coleville	2008	May	1	0	5,597
West Walker R., at Coleville	2008	June	1	0	5,597
West Walker R., at Coleville	2008	July	1	3	5,597
West Walker R., at Coleville	2008	August	1	2	5,597
West Walker R., at Coleville	2008	September	1	1	5,597
West Walker R., at Coleville	2008	October	1	1	5,597
West Walker R., at Coleville	2008	November	1	0	5,597
West Walker R., at Coleville	2009	January	1	0	5,597
West Walker R., at Coleville	2009	February	1	0	5,597
West Walker R., at Coleville	2009	March	1	0	5,597
West Walker R., at Coleville	2009	April	1	0	5,597
West Walker R., at Coleville	2009	May	1	2	5,597
West Walker R., at Coleville	2009	June	1	8	5,597
West Walker R., at Coleville	2009	July	1	4	5,597
West Walker R., at Coleville	2009	August	1	2	5,597
West Walker R., at Coleville	2009	September	1	0	5,597
West Walker R., at Coleville	2009	October	1	1	5,597
West Walker R., at Coleville	2009	November	1	0	5,597
West Walker R., at Coleville	2010	January	1	0	5,597
West Walker R., at Coleville	2010	February	1	0	5,597
West Walker R., at Coleville	2010	March	1	0	5,597
West Walker R., at Coleville	2010	April	1	0	5,597
West Walker R., at Coleville	2010	May	1	0	5,597
West Walker R., at Coleville	2010	June	1	2	5,597
West Walker R., at Coleville	2010	July	1	0	5,597
West Walker R., at Coleville	2010	August	1	0	5,597
West Walker R., at Coleville	2010	September	1	0	5,597
West Walker R., at Coleville	2010	October	1	1	5,597
West Walker R., at Coleville	2010	November	1	1	5,597

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
West Walker R., at Coleville	2011	January	1	0	5,597
West Walker R., at Coleville	2011	March	1	0	5,597
West Walker R., at Coleville	2011	April	1	0	5,597
West Walker R., at Coleville	2011	May	1	0	5,597
West Walker R., at Coleville	2011	June	1	0	5,597
West Walker R., at Coleville	2011	July	1	20	5,597
West Walker R., at Coleville	2011	August	1	8	5,597
West Walker R., at Coleville	2011	September	3	1	5,597
West Walker R., at Coleville	2011	October	6	1	5,597
West Walker R., at Coleville	2011	December	1	1	5,597
West Walker R. above confl w/ Little Walker R.	2008	May	1	0	6,598
West Walker R. above confl w/ Little Walker R.	2008	August	1	3	6,598
West Walker R. above confl w/ Little Walker R.	2008	September	1	0	6,598
West Walker R. above confl w/ Little Walker R.	2008	October	1	0	6,598
West Walker R. above confl w/ Little Walker R.	2008	November	1	0	6,598
West Walker R. above confl w/ Little Walker R.	2008	December	1	0	6,598
West Walker R. above confl w/ Little Walker R.	2010	October	1	5	6,598
West Walker R. above confl w/ Little Walker R.	2011	January	1	0	6,598
West Walker R. above confl w/ Little Walker R.	2011	April	1	0	6,598
West Walker R. above confl w/ Little Walker R.	2011	May	1	0	6,598
West Walker R. above confl w/ Little Walker R.	2011	June	1	5	6,598
West Walker R. above confl w/ Little Walker R.	2011	July	1	5	6,598
West Walker R. above confl w/ Little Walker R.	2011	August	1	2	6,598
West Walker R. above confl w/ Little Walker R.	2011	September	1	1	6,598
West Walker R. at Topaz	2008	February	1	0	5,046
West Walker R. at Topaz	2008	March	1	2	5,046
West Walker R. at Topaz	2008	April	1	2	5,046
West Walker R. at Topaz	2008	May	1	6	5,046
West Walker R. at Topaz	2008	June	1	10	5,046
West Walker R. at Topaz	2008	July	1	14	5,046
West Walker R. at Topaz	2008	August	1	32	5,046
West Walker R. at Topaz	2008	September	1	19	5,046

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
West Walker R. at Topaz	2008	October	1	28	5,046
West Walker R. at Topaz	2008	November	1	3	5,046
West Walker R. at Topaz	2009	January	1	0	5,046
West Walker R. at Topaz	2009	February	1	0	5,046
West Walker R. at Topaz	2009	March	1	0	5,046
West Walker R. at Topaz	2009	April	1	6	5,046
West Walker R. at Topaz	2009	May	1	19	5,046
West Walker R. at Topaz	2009	June	1	14	5,046
West Walker R. at Topaz	2009	July	1	16	5,046
West Walker R. at Topaz	2009	August	1	24	5,046
West Walker R. at Topaz	2009	September	1	72	5,046
West Walker R. at Topaz	2009	October	1	13	5,046
West Walker R. at Topaz	2009	November	1	1	5,046
West Walker R. at Topaz	2010	January	1	3	5,046
West Walker R. at Topaz	2010	February	1	0	5,046
West Walker R. at Topaz	2010	March	1	1	5,046
West Walker R. at Topaz	2010	April	1	1	5,046
West Walker R. at Topaz	2010	May	1	65	5,046
West Walker R. at Topaz	2010	June	1	24	5,046
West Walker R. at Topaz	2010	July	1	40	5,046
West Walker R. at Topaz	2010	August	1	24	5,046
West Walker R. at Topaz	2010	September	1	14	5,046
West Walker R. at Topaz	2010	October	1	39	5,046
West Walker R. at Topaz	2010	November	1	3	5,046
West Walker R. at Topaz	2011	January	1	10	5,046
West Walker R. at Topaz	2011	April	1	0	5,046
West Walker R. at Topaz	2011	May	1	15	5,046
West Walker R. at Topaz	2011	June	1	10	5,046
West Walker R. at Topaz	2011	July	1	10	5,046
West Walker R. at Topaz	2011	August	1	30	5,046
West Walker R. at Topaz	2011	September	4	19	5,046
West Walker R. at Topaz	2011	October	6	9	5,046

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
West Walker R. at Topaz	2011	December	1	0	5,046
West Walker R. above Pack Station	2010	October	1	1	7,182
West Walker R. above Pack Station	2011	January	1	0	7,182
West Walker R. above Pack Station	2011	April	1	0	7,182
West Walker R. above Pack Station	2011	May	1	0	7,182
West Walker R. above Pack Station	2011	June	1	0	7,182
West Walker R. above Pack Station	2011	July	1	2	7,182
West Walker R. above Pack Station	2011	August	1	0	7,182
West Walker R. above Pack Station	2011	September	1	1	7,182
East Fork Carson R. Hydologic Unit 632					
East Fork Carson, at USGS gage blw Markleeville	2003	November	1	2	5,413
East Fork Carson, at USGS gage blw Markleeville	2004	February	1	3	5,413
East Fork Carson, at USGS gage blw Markleeville	2004	May	1	3	5,413
East Fork Carson, at USGS gage blw Markleeville	2004	August	1	240	5,413
East Fork Carson, at USGS gage blw Markleeville	2004	November	1	3	5,413
East Fork Carson, at USGS gage blw Markleeville	2005	February	1	1	5,413
East Fork Carson, at USGS gage blw Markleeville	2005	May	1	9	5,413
East Fork Carson, at USGS gage blw Markleeville	2007	August	1	15	5,413
East Fork Carson, at USGS gage blw Markleeville	2007	September	1	3	5,413
East Fork Carson, at USGS gage blw Markleeville	2007	October	1	2	5,413
East Fork Carson, at USGS gage blw Markleeville	2007	November	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2007	December	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	January	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	February	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	March	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	April	1	1	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	May	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	June	1	4	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	July	2	81	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	August	1	4	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	September	1	1	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	October	1	0	5,413

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
East Fork Carson, at USGS gage blw Markleeville	2008	November	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2008	December	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2009	January	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2009	May	1	10	5,413
East Fork Carson, at USGS gage blw Markleeville	2009	June	1	48	5,413
East Fork Carson, at USGS gage blw Markleeville	2009	August	1	16	5,413
East Fork Carson, at USGS gage blw Markleeville	2009	September	2	2	5,413
East Fork Carson, at USGS gage blw Markleeville	2009	October	1	3	5,413
East Fork Carson, at USGS gage blw Markleeville	2009	November	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2009	December	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2010	February	2	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2010	March	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2010	April	1	10	5,413
East Fork Carson, at USGS gage blw Markleeville	2010	May	1	1	5,413
East Fork Carson, at USGS gage blw Markleeville	2010	July	1	24	5,413
East Fork Carson, at USGS gage blw Markleeville	2010	August	1	7	5,413
East Fork Carson, at USGS gage blw Markleeville	2010	October	1	1	5,413
East Fork Carson, at USGS gage blw Markleeville	2010	November	1	7	5,413
East Fork Carson, at USGS gage blw Markleeville	2011	January	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2011	March	1	4	5,413
East Fork Carson, at USGS gage blw Markleeville	2011	April	1	4	5,413
East Fork Carson, at USGS gage blw Markleeville	2011	May	1	1	5,413
East Fork Carson, at USGS gage blw Markleeville	2011	June	1	6	5,413
East Fork Carson, at USGS gage blw Markleeville	2011	July	1	5	5,413
East Fork Carson, at USGS gage blw Markleeville	2011	August	1	0	5,413
East Fork Carson, at USGS gage blw Markleeville	2011	September	1	0	5,413
East Fork Carson R., above Hangman's bridge	2013	July	1	17	5,604
East Fork Carson R., above Hangman's bridge	2013	August	4	25	5,604
East Fork Carson R., above Hangman's bridge	2013	September	3	3	5,604
East Fork Carson R., above Hangman's bridge	2013	October	3	1	5,604
East Fork Carson R., above Hangman's bridge	2013	November	1	1	5,604
East Fork Carson R., above bridge 31-13	2013	July	1	18	6,010

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
East Fork Carson R., above bridge 31-13	2013	August	3	9	6,010
East Fork Carson R., above bridge 31-13	2013	September	3	1	6,010
East Fork Carson R., above bridge 31-13	2013	October	3	5	6,010
East Fork Carson R., above bridge 31-13	2013	November	1	0	6,010
East Fork Carson R., above Silver Cr	2013	August	3	8	6,024
East Fork Carson R., above Silver Cr	2013	September	3	3	6,024
East Fork Carson R., above Silver Cr	2013	October	3	1	6,024
East Fork Carson R., above Wolf Cr	2013	July	1	18	6,201
East Fork Carson R., above Wolf Cr	2013	August	3	2	6,201
East Fork Carson R., above Wolf Cr	2013	September	3	1	6,201
East Fork Carson R., above Wolf Cr	2013	October	3	2	6,201
East Fork Carson R., above Wolf Cr	2013	November	1	1	6,201
Hotsprings Cr at Hotsprings Cr Road	2010	June	8	2	5,797
Hotsprings Cr at Hotsprings Cr Road	2010	July	14	3	5,797
Hotsprings Cr at Hotsprings Cr Road	2010	August	11	3	5,797
Hotsprings Cr at Hotsprings Cr Road	2010	September	9	5	5,797
Hotsprings Cr at Hotsprings Cr Road	2010	October	5	3	5,797
Hotsprings Cr at Hotsprings Cr Road	2010	November	4	1	5,797
Hotsprings Cr at Hotsprings Cr Road	2011	June	5	2	5,797
Hotsprings Cr at Hotsprings Cr Road	2011	July	4	3	5,797
Hotsprings Cr at Hotsprings Cr Road	2011	August	5	7	5,797
Hotsprings Cr at Hotsprings Cr Road	2011	September	5	17	5,797
Hotsprings Cr at Hotsprings Cr Road	2011	October	3	3	5,797
Hotsprings Cr at Hotsprings Cr Road	2012	April	2	1	5,797
Hotsprings Cr at Hotsprings Cr Road	2012	May	4	1	5,797
Hotsprings Cr at Hotsprings Cr Road	2012	June	5	6	5,797
Hotsprings Cr at Hotsprings Cr Road	2012	July	5	23	5,797
Hotsprings Cr at Hotsprings Cr Road	2012	August	5	12	5,797
Hotsprings Cr at Hotsprings Cr Road	2012	September	5	10	5,797
Hotsprings Cr at Hotsprings Cr Road	2012	October	1	5	5,797
Hotsprings Cr at Hotsprings Cr Road	2012	November	1	0	5,797
Hotsprings Cr at Hotsprings Cr Road	2013	April	1	0	5,797

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Hotsprings Cr at Hotsprings Cr Road	2013	May	1	1	5,797
Hotsprings Cr at Hotsprings Cr Road	2013	June	2	2	5,797
Hotsprings Cr at Hotsprings Cr Road	2013	July	4	17	5,797
Hotsprings Cr at Hotsprings Cr Road	2013	August	4	30	5,797
Hotsprings Cr at Hotsprings Cr Road	2013	September	5	5	5,797
Hotsprings Cr at Hotsprings Cr Road	2013	October	5	1	5,797
Hotsprings Cr above Grover Hotsprings Campground	2010	May	1	0	5,837
Hotsprings Cr above Grover Hotsprings Campground	2010	June	8	1	5,837
Hotsprings Cr above Grover Hotsprings Campground	2010	July	12	3	5,837
Hotsprings Cr above Grover Hotsprings Campground	2010	August	12	2	5,837
Hotsprings Cr above Grover Hotsprings Campground	2010	September	8	2	5,837
Hotsprings Cr above Grover Hotsprings Campground	2010	October	5	3	5,837
Hotsprings Cr above Grover Hotsprings Campground	2010	November	4	1	5,837
Hotsprings Cr above Grover Hotsprings Campground	2010	December	1	1	5,837
Hotsprings Cr above Grover Hotsprings Campground	2011	June	5	0	5,837
Hotsprings Cr above Grover Hotsprings Campground	2011	July	5	2	5,837
Hotsprings Cr above Grover Hotsprings Campground	2011	August	6	3	5,837
Hotsprings Cr above Grover Hotsprings Campground	2011	September	5	7	5,837
Hotsprings Cr above Grover Hotsprings Campground	2011	October	3	2	5,837
Hotsprings Cr above Grover Hotsprings Campground	2012	April	2	4	5,837
Hotsprings Cr above Grover Hotsprings Campground	2012	May	4	1	5,837
Hotsprings Cr above Grover Hotsprings Campground	2012	June	5	2	5,837
Hotsprings Cr above Grover Hotsprings Campground	2012	July	5	5	5,837
Hotsprings Cr above Grover Hotsprings Campground	2012	August	5	3	5,837
Hotsprings Cr above Grover Hotsprings Campground	2012	September	5	13	5,837
Hotsprings Cr above Grover Hotsprings Campground	2012	October	1	6	5,837
Hotsprings Cr above Grover Hotsprings Campground	2012	November	1	2	5,837
Hotsprings Cr above Grover Hotsprings Campground	2013	April	1	0	5,837
Hotsprings Cr above Grover Hotsprings Campground	2013	May	1	1	5,837
Hotsprings Cr above Grover Hotsprings Campground	2013	June	2	1	5,837
Hotsprings Cr above Grover Hotsprings Campground	2013	July	4	10	5,837
Hotsprings Cr above Grover Hotsprings Campground	2013	August	4	20	5,837

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Hotsprings Cr above Grover Hotsprings Campground	2013	September	5	3	5,837
Hotsprings Cr above Grover Hotsprings Campground	2013	October	5	1	5,837
confl Millberry Cr w/ Markleeville Cr	2010	May	1	27	5,509
confl Millberry Cr w/ Markleeville Cr	2010	June	9	64	5,509
confl Millberry Cr w/ Markleeville Cr	2010	July	13	88	5,509
confl Millberry Cr w/ Markleeville Cr	2010	August	12	67	5,509
confl Millberry Cr w/ Markleeville Cr	2010	September	8	67	5,509
confl Millberry Cr w/ Markleeville Cr	2010	October	5	57	5,509
confl Millberry Cr w/ Markleeville Cr	2010	November	4	7	5,509
confl Millberry Cr w/ Markleeville Cr	2010	December	1	6	5,509
confl Millberry Cr w/ Markleeville Cr	2011	June	5	15	5,509
confl Millberry Cr w/ Markleeville Cr	2011	July	5	45	5,509
confl Millberry Cr w/ Markleeville Cr	2011	August	6	20	5,509
confl Millberry Cr w/ Markleeville Cr	2011	September	5	8	5,509
confl Millberry Cr w/ Markleeville Cr	2011	October	3	1	5,509
confl Millberry Cr w/ Markleeville Cr	2012	April	2	1	5,509
confl Millberry Cr w/ Markleeville Cr	2012	May	4	3	5,509
confl Millberry Cr w/ Markleeville Cr	2012	June	5	128	5,509
confl Millberry Cr w/ Markleeville Cr	2012	July	5	99	5,509
confl Millberry Cr w/ Markleeville Cr	2012	August	5	60	5,509
confl Millberry Cr w/ Markleeville Cr	2012	September	5	9	5,509
confl Millberry Cr w/ Markleeville Cr	2012	October	1	62	5,509
confl Millberry Cr w/ Markleeville Cr	2012	November	1	68	5,509
confl Millberry Cr w/ Markleeville Cr	2013	April	1	6	5,509
confl Millberry Cr w/ Markleeville Cr	2013	May	1	34	5,509
confl Millberry Cr w/ Markleeville Cr	2013	June	2	41	5,509
confl Millberry Cr w/ Markleeville Cr	2013	July	4	106	5,509
confl Millberry Cr w/ Markleeville Cr	2013	August	4	30	5,509
confl Millberry Cr w/ Markleeville Cr	2013	September	5	6	5,509
confl Millberry Cr w/ Markleeville Cr	2013	October	5	4	5,509
Millberry Cr behind Post Office	2010	June	2	42	5,492
Millberry Cr behind Post Office	2010	July	13	64	5,492

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Millberry Cr behind Post Office	2010	August	12	45	5,492
Millberry Cr behind Post Office	2010	September	9	42	5,492
Millberry Cr behind Post Office	2010	October	5	27	5,492
Millberry Cr behind Post Office	2010	November	4	6	5,492
Millberry Cr behind Post Office	2010	December	1	2	5,492
Millberry Cr behind Post Office	2011	June	1	2	5,492
Millberry Cr at 30 mph Sign	2012	May	2	7	5,568
Millberry Cr at 30 mph Sign	2012	June	5	184	5,568
Millberry Cr at 30 mph Sign	2012	July	5	72	5,568
Millberry Cr at 30 mph Sign	2012	August	5	44	5,568
Millberry Cr at 30 mph Sign	2012	September	5	12	5,568
Millberry Cr at 30 mph Sign	2012	October	1	2	5,568
Millberry Cr at 30 mph Sign	2012	November	1	3	5,568
Millberry Cr at 30 mph Sign	2013	April	1	1	5,568
Millberry Cr at 30 mph Sign	2013	May	1	66	5,568
Millberry Cr at 30 mph Sign	2013	June	2	73	5,568
Millberry Cr at 30 mph Sign	2013	July	4	74	5,568
Millberry Cr at 30 mph Sign	2013	August	3	14	5,568
Millberry Cr at 30 mph Sign	2013	September	5	8	5,568
Millberry Cr at 30 mph Sign	2013	October	5	4	5,568
Millberry Cr above house	2010	May	1	0	5,804
Millberry Cr above house	2010	June	7	3	5,804
Millberry Cr above house	2010	August	3	2	5,804
Millberry Cr above house	2010	September	6	1	5,804
Millberry Cr above house	2010	October	4	8	5,804
Millberry Cr above house	2010	November	4	2	5,804
Millberry Cr above house	2010	December	1	4	5,804
Millberry Cr above house	2011	June	5	1	5,804
Millberry Cr above house	2011	July	5	2	5,804
Millberry Cr above house	2011	August	5	3	5,804
Millberry Cr above house	2012	April	2	1	5,804
Millberry Cr above house	2012	May	4	1	5,804

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Millberry Cr above house	2012	June	4	3	5,804
Millberry Cr above house	2013	April	1	2	5,804
Millberry Cr above house	2013	May	1	2	5,804
Millberry Cr above house	2013	June	2	2	5,804
Millberry Cr above house	2013	July	1	7	5,804
Markeeville Cr at USFS Campground	2010	May	1	2	5,499
Markeeville Cr at USFS Campground	2010	June	10	16	5,499
Markeeville Cr at USFS Campground	2010	July	13	29	5,499
Markeeville Cr at USFS Campground	2010	August	11	53	5,499
Markeeville Cr at USFS Campground	2010	September	10	20	5,499
Markeeville Cr at USFS Campground	2010	October	4	14	5,499
Markeeville Cr at USFS Campground	2010	November	4	1	5,499
Markeeville Cr at USFS Campground	2010	December	1	1	5,499
Markeeville Cr at USFS Campground	2011	June	4	9	5,499
Markeeville Cr at USFS Campground	2011	July	5	58	5,499
Markeeville Cr at USFS Campground	2011	August	6	85	5,499
Markeeville Cr at USFS Campground	2011	September	5	40	5,499
Markeeville Cr at USFS Campground	2011	October	3	5	5,499
Markeeville Cr at USFS Campground	2012	April	2	2	5,499
Markeeville Cr at USFS Campground	2012	May	4	3	5,499
Markeeville Cr at USFS Campground	2012	June	5	67	5,499
Markeeville Cr at USFS Campground	2012	July	5	99	5,499
Markeeville Cr at USFS Campground	2012	August	5	95	5,499
Markeeville Cr at USFS Campground	2012	September	5	28	5,499
Markeeville Cr at USFS Campground	2012	October	1	10	5,499
Markeeville Cr at USFS Campground	2012	November	1	1	5,499
Markeeville Cr at USFS Campground	2013	May	1	103	5,499
Markeeville Cr at USFS Campground	2013	June	2	199	5,499
Markeeville Cr at USFS Campground	2013	July	4	85	5,499
Markeeville Cr at USFS Campground	2013	August	4	226	5,499
Markeeville Cr at USFS Campground	2013	September	5	28	5,499
Markeeville Cr at USFS Campground	2013	October	5	3	5,499

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Markleeville Cr at Swim Hole	2010	July	3	45	5,512
Markleeville Cr at Swim Hole	2010	August	12	35	5,512
Markleeville Cr at Swim Hole	2010	September	9	20	5,512
Markleeville Cr at Swim Hole	2010	October	5	31	5,512
Markleeville Cr at Swim Hole	2010	November	4	1	5,512
Markleeville Cr at Swim Hole	2010	December	1	2	5,512
Markleeville Cr at Swim Hole	2011	June	5	16	5,512
Markleeville Cr at Swim Hole	2011	July	5	41	5,512
Markleeville Cr at Swim Hole	2011	August	6	75	5,512
Markleeville Cr at Swim Hole	2011	September	5	41	5,512
Markleeville Cr at Swim Hole	2011	October	2	8	5,512
Markleeville Cr at Swim Hole	2012	April	2	2	5,512
Markleeville Cr at Swim Hole	2012	May	4	6	5,512
Markleeville Cr at Swim Hole	2012	June	5	47	5,512
Markleeville Cr at Swim Hole	2012	July	5	117	5,512
Markleeville Cr at Swim Hole	2012	August	5	26	5,512
Markleeville Cr at Swim Hole	2012	September	5	27	5,512
Markleeville Cr at Swim Hole	2012	October	1	4	5,512
Markleeville Cr at Swim Hole	2012	November	1	1	5,512
Markleeville Cr at Swim Hole	2013	April	1	0	5,512
Markleeville Cr at Swim Hole	2013	May	1	183	5,512
Markleeville Cr at Swim Hole	2013	June	2	57	5,512
Markleeville Cr at Swim Hole	2013	July	4	110	5,512
Markleeville Cr at Swim Hole	2013	August	4	167	5,512
Markleeville Cr at Swim Hole	2013	September	5	14	5,512
Markleeville Cr at Swim Hole	2013	October	5	4	5,512
Markleeville Cr at Library Bridge	2010	May	1	3	5,518
Markleeville Cr at Library Bridge	2010	June	9	23	5,518
Markleeville Cr at Library Bridge	2010	July	13	20	5,518
Markleeville Cr at Library Bridge	2010	August	12	33	5,518
Markleeville Cr at Library Bridge	2010	September	9	13	5,518
Markleeville Cr at Library Bridge	2010	October	5	18	5,518

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Markleeville Cr at Library Bridge	2010	November	4	1	5,518
Markleeville Cr at Library Bridge	2010	December	1	2	5,518
Markleeville Cr at Library Bridge	2011	June	5	17	5,518
Markleeville Cr at Library Bridge	2011	July	6	18	5,518
Markleeville Cr at Library Bridge	2011	August	7	61	5,518
Markleeville Cr at Library Bridge	2011	September	5	58	5,518
Markleeville Cr at Library Bridge	2011	October	3	12	5,518
Markleeville Cr at Library Bridge	2012	April	2	1	5,518
Markleeville Cr at Library Bridge	2012	May	4	3	5,518
Markleeville Cr at Library Bridge	2012	June	5	41	5,518
Markleeville Cr at Library Bridge	2012	July	5	116	5,518
Markleeville Cr at Library Bridge	2012	August	5	28	5,518
Markleeville Cr at Library Bridge	2012	September	5	24	5,518
Markleeville Cr at Library Bridge	2012	October	1	8	5,518
Markleeville Cr at Library Bridge	2012	November	1	4	5,518
Markleeville Cr at Library Bridge	2013	April	1	1	5,518
Markleeville Cr at Library Bridge	2013	May	1	173	5,518
Markleeville Cr at Library Bridge	2013	June	2	185	5,518
Markleeville Cr at Library Bridge	2013	July	4	96	5,518
Markleeville Cr at Library Bridge	2013	August	4	209	5,518
Markleeville Cr at Library Bridge	2013	September	5	16	5,518
Markleeville Cr at Library Bridge	2013	October	5	3	5,518
Pleasant Valley Cr	2011	June	2	14	5,817
Pleasant Valley Cr	2011	July	5	9	5,817
Pleasant Valley Cr	2011	August	6	9	5,817
Pleasant Valley Cr	2011	September	5	22	5,817
Pleasant Valley Cr	2011	October	2	7	5,817
Silver Cr, above East Fork Carson R.	2013	August	3	9	5,945
Silver Cr, above East Fork Carson R.	2013	September	3	5	5,945
Silver Cr, above East Fork Carson R.	2013	October	3	7	5,945
Silver Cr, above East Fork Carson R.	2013	November	1	2	5,945
Wolf Cr, above East Fork Carson R.	2013	August	3	71	6,198

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Wolf Cr, above East Fork Carson R.	2013	September	3	24	6,198
Wolf Cr, above East Fork Carson R.	2013	October	3	13	6,198
Wolf Cr, above East Fork Carson R.	2013	November	1	4	6,198
Wolf Cr, Below Ranch	2013	September	1	90	6,398
Wolf Cr, Below Ranch	2013	October	3	21	6,398
Wolf Cr, Below Ranch	2013	November	1	11	6,398
West Fork Carson R. Hydrologic Unit 633					
West Fork Carson R. below Willow Cr	2003	November	1	1	7,090
West Fork Carson R. below Willow Cr	2004	February	1	1	7,090
West Fork Carson R. below Willow Cr	2004	May	1	1	7,090
West Fork Carson R. below Willow Cr	2004	August	1	48	7,090
West Fork Carson R. below Willow Cr	2004	November	1	1	7,090
West Fork Carson R. below Willow Cr	2005	February	1	1	7,090
West Fork Carson R. below Willow Cr	2005	May	1	1	7,090
West Fork Carson R. below Willow Cr	2007	August	1	2	7,090
West Fork Carson R. below Willow Cr	2007	September	1	1	7,090
West Fork Carson R. below Willow Cr	2007	October	1	0	7,090
West Fork Carson R. below Willow Cr	2007	November	1	1	7,090
West Fork Carson R. below Willow Cr	2007	December	1	1	7,090
West Fork Carson R. below Willow Cr	2008	January	1	0	7,090
West Fork Carson R. below Willow Cr	2008	February	1	2	7,090
West Fork Carson R. below Willow Cr	2008	April	1	0	7,090
West Fork Carson R. below Willow Cr	2008	May	1	0	7,090
West Fork Carson R. below Willow Cr	2008	June	1	0	7,090
West Fork Carson R. below Willow Cr	2008	July	1	12	7,090
West Fork Carson R. below Willow Cr	2008	August	1	1	7,090
West Fork Carson R. below Willow Cr	2008	September	1	0	7,090
West Fork Carson R. below Willow Cr	2008	October	1	1	7,090
West Fork Carson R. below Willow Cr	2008	November	1	0	7,090
West Fork Carson R. below Willow Cr	2008	December	1	0	7,090
West Fork Carson R. below Willow Cr	2009	January	1	0	7,090
West Fork Carson R. below Willow Cr	2009	May	1	0	7,090

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
West Fork Carson R. below Willow Cr	2009	June	1	4	7,090
West Fork Carson R. below Willow Cr	2009	August	1	1	7,090
West Fork Carson R. below Willow Cr	2009	September	2	2	7,090
West Fork Carson R. below Willow Cr	2009	October	1	0	7,090
West Fork Carson R. below Willow Cr	2009	November	1	3	7,090
West Fork Carson R. below Willow Cr	2010	February	2	0	7,090
West Fork Carson R. below Willow Cr	2010	March	1	0	7,090
West Fork Carson R. below Willow Cr	2010	April	1	0	7,090
West Fork Carson R. below Willow Cr	2010	May	1	0	7,090
West Fork Carson R. below Willow Cr	2010	July	1	3	7,090
West Fork Carson R. below Willow Cr	2010	August	1	3	7,090
West Fork Carson R. below Willow Cr	2010	September	1	1	7,090
West Fork Carson R. below Willow Cr	2010	October	1	3	7,090
West Fork Carson R. below Willow Cr	2010	November	1	2	7,090
West Fork Carson R. below Willow Cr	2011	March	1	0	7,090
West Fork Carson R. below Willow Cr	2011	April	1	0	7,090
West Fork Carson R. below Willow Cr	2011	May	1	0	7,090
West Fork Carson R. below Willow Cr	2011	June	1	1	7,090
West Fork Carson R. below Willow Cr	2011	July	1	10	7,090
West Fork Carson R. below Willow Cr	2011	August	1	2	7,090
West Fork Carson R. below Willow Cr	2011	September	1	37	7,090
West Fork Carson R. below Willow Cr	2011	October	1	5	7,090
West Fork Carson R., at HWY 89 (Hope Valley)	2008	June	1	0	5,180
West Fork Carson R. at Paynesville Bridge	2010	May	1	3	5,180
West Fork Carson R. at Paynesville Bridge	2010	June	9	47	5,180
West Fork Carson R. at Paynesville Bridge	2010	July	13	108	5,180
West Fork Carson R. at Paynesville Bridge	2010	August	11	45	5,180
West Fork Carson R. at Paynesville Bridge	2010	September	9	43	5,180
West Fork Carson R. at Paynesville Bridge	2010	October	5	63	5,180
West Fork Carson R. at Paynesville Bridge	2010	November	4	3	5,180
West Fork Carson R. at Paynesville Bridge	2010	December	1	3	5,180
West Fork Carson R. at Paynesville Bridge	2011	June	5	41	5,180

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
West Fork Carson R. at Paynesville Bridge	2011	July	5	39	5,180
West Fork Carson R. at Paynesville Bridge	2011	August	6	26	5,180
West Fork Carson R. at Paynesville Bridge	2011	September	5	103	5,180
West Fork Carson R. at Paynesville Bridge	2011	October	3	26	5,180
West Fork Carson R. at Paynesville Bridge	2012	April	2	14	5,180
West Fork Carson R. at Paynesville Bridge	2012	May	4	33	5,180
West Fork Carson R. at Paynesville Bridge	2012	June	5	26	5,180
West Fork Carson R. at Paynesville Bridge	2012	July	5	33	5,180
West Fork Carson R. at Paynesville Bridge	2012	August	5	44	5,180
West Fork Carson R. at Paynesville Bridge	2012	September	5	35	5,180
West Fork Carson R. at Paynesville Bridge	2012	October	1	10	5,180
West Fork Carson R. at Paynesville Bridge	2012	November	1	2	5,180
West Fork Carson R. at Paynesville Bridge	2013	April	1	2	5,180
West Fork Carson R. at Paynesville Bridge	2013	May	1	12	5,180
West Fork Carson R. at Paynesville Bridge	2013	June	2	49	5,180
West Fork Carson R. at Paynesville Bridge	2013	July	4	138	5,180
West Fork Carson R. at Paynesville Bridge	2013	August	6	24	5,180
West Fork Carson R. at Paynesville Bridge	2013	September	8	21	5,180
West Fork Carson R. at Paynesville Bridge	2013	October	8	3	5,180
West Fork Carson R. at Paynesville Bridge	2013	November	1	0	5,180
West Fork Carson R. at Woodford's Bridge	2010	May	1	0	5,600
West Fork Carson R. at Woodford's Bridge	2010	June	9	2	5,600
West Fork Carson R. at Woodford's Bridge	2010	July	13	4	5,600
West Fork Carson R. at Woodford's Bridge	2010	August	12	2	5,600
West Fork Carson R. at Woodford's Bridge	2010	September	9	3	5,600
West Fork Carson R. at Woodford's Bridge	2010	October	5	10	5,600
West Fork Carson R. at Woodford's Bridge	2010	November	4	1	5,600
West Fork Carson R. at Woodford's Bridge	2010	December	1	1	5,600
West Fork Carson R. at Woodford's Bridge	2011	June	5	1	5,600
West Fork Carson R. at Woodford's Bridge	2011	July	5	4	5,600
West Fork Carson R. at Woodford's Bridge	2011	August	6	1	5,600
West Fork Carson R. at Woodford's Bridge	2011	September	5	2	5,600

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
West Fork Carson R. at Woodford's Bridge	2011	October	3	3	5,600
West Fork Carson R. at Woodford's Bridge	2012	April	2	0	5,600
West Fork Carson R. at Woodford's Bridge	2012	May	4	2	5,600
West Fork Carson R. at Woodford's Bridge	2012	June	5	1	5,600
West Fork Carson R. at Woodford's Bridge	2012	July	5	2	5,600
West Fork Carson R. at Woodford's Bridge	2012	August	5	2	5,600
West Fork Carson R. at Woodford's Bridge	2012	September	5	3	5,600
West Fork Carson R. at Woodford's Bridge	2012	October	1	7	5,600
West Fork Carson R. at Woodford's Bridge	2012	November	1	21	5,600
West Fork Carson R. at Woodford's Bridge	2013	April	1	0	5,600
West Fork Carson R. at Woodford's Bridge	2013	May	1	2	5,600
West Fork Carson R. at Woodford's Bridge	2013	June	2	2	5,600
West Fork Carson R. at Woodford's Bridge	2013	July	4	8	5,600
West Fork Carson R. at Woodford's Bridge	2013	August	6	1	5,600
West Fork Carson R. at Woodford's Bridge	2013	September	8	2	5,600
West Fork Carson R. at Woodford's Bridge	2013	October	8	1	5,600
West Fork Carson R. at Woodford's Bridge	2013	November	1	0	5,600
West Fork Carson R. at Pickett's Bridge	2010	May	1	0	7,034
West Fork Carson R. at Pickett's Bridge	2010	June	9	1	7,034
West Fork Carson R. at Pickett's Bridge	2010	July	13	3	7,034
West Fork Carson R. at Pickett's Bridge	2010	August	12	2	7,034
West Fork Carson R. at Pickett's Bridge	2010	September	9	1	7,034
West Fork Carson R. at Pickett's Bridge	2010	October	5	1	7,034
West Fork Carson R. at Pickett's Bridge	2010	November	4	1	7,034
West Fork Carson R. at Pickett's Bridge	2011	June	1	0	7,034
West Fork Carson R. at Pickett's Bridge	2013	July	1	9	7,034
West Fork Carson R., below Hope Valley Campground	2013	August	3	8	7,139
West Fork Carson R., below Hope Valley Campground	2013	September	3	1	7,139
West Fork Carson R., below Hope Valley Campground	2013	October	3	1	7,139
West Fork Carson R., below Hope Valley Campground	2013	November	1	1	7,139
West Fork Carson R., above Hope Valley Campground	2013	August	3	2	7,156
West Fork Carson R., above Hope Valley Campground	2013	September	3	2	7,156

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
West Fork Carson R., above Hope Valley Campground	2013	October	3	1	7,156
West Fork Carson R., above Hope Valley Campground	2013	November	1	0	7,156
West Fork Carson R., above Forestdale Cr	2013	August	3	12	7,575
West Fork Carson R., above Forestdale Cr	2013	September	3	1	7,575
West Fork Carson R., above Forestdale Cr	2013	October	3	1	7,575
West Fork Carson R., above Forestdale Cr	2013	November	1	0	7,575
Lake Tahoe Hydrologic Unit 634					
General Cr, at Lake Tahoe	2013	July	1	3	6,227
General Cr, at Lake Tahoe	2013	August	3	11	6,227
General Cr, at Lake Tahoe	2013	September	3	3	6,227
General Cr, at Lake Tahoe	2013	October	3	1	6,227
General Cr, above Hwy 89	2013	July	1	3	6,257
General Cr, above Hwy 89	2013	August	3	11	6,257
General Cr, above Hwy 89	2013	September	3	3	6,257
General Cr, above Hwy 89	2013	October	3	1	6,257
General Cr, above campground	2013	July	1	0	6,394
General Cr, above campground	2013	August	3	6	6,394
General Cr, above campground	2013	September	3	3	6,394
General Cr, above campground	2013	October	3	1	6,394
General Cr, above loop road	2013	July	1	0	6,598
General Cr, above loop road	2013	August	3	1	6,598
General Cr, above loop road	2013	September	3	0	6,598
General Cr, above loop road	2013	October	3	0	6,598
General Cr, above Lily Pond	2013	July	1	1	6,598
General Cr, above Lily Pond	2013	August	3	2	6,598
General Cr, above Lily Pond	2013	September	3	1	6,598
General Cr, above Lily Pond	2013	October	3	0	6,598
Tallac Cr at Baldwin Beach	2010	June	9	7	6,243
Tallac Cr at Baldwin Beach	2010	July	11	26	6,243
Tallac Cr at Baldwin Beach	2010	August	11	18	6,243
Tallac Cr at Baldwin Beach	2010	September	9	3	6,243
Tallac Cr at Baldwin Beach	2010	October	5	9	6,243

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Tallac Cr at Baldwin Beach	2010	November	1	0	6,243
Tallac Cr at Baldwin Beach	2011	June	4	32	6,243
Tallac Cr at Baldwin Beach	2011	July	4	15	6,243
Tallac Cr at Baldwin Beach	2011	August	5	9	6,243
Tallac Cr at Baldwin Beach	2011	September	5	3	6,243
Tallac Cr at Baldwin Beach	2011	October	4	1	6,243
Tallac Cr at Baldwin Beach	2012	May	5	7	6,243
Tallac Cr at Baldwin Beach	2012	June	5	32	6,243
Tallac Cr at Baldwin Beach	2012	July	4	8	6,243
Tallac Cr at Baldwin Beach	2012	August	4	6	6,243
Tallac Cr at Baldwin Beach	2012	September	3	53	6,243
Tallac Cr at Baldwin Beach	2012	November	1	0	6,243
Tallac Cr at Baldwin Beach	2013	May	1	5	6,243
Tallac Cr at Baldwin Beach	2013	June	4	10	6,243
Tallac Cr at Baldwin Beach	2013	July	3	22	6,243
Tallac Cr at Baldwin Beach	2013	August	1	51	6,243
Tallac Cr at Baldwin Beach	2013	September	5	2	6,243
Tallac Cr at Baldwin Beach	2013	October	5	3	6,243
Tallac Cr at Highway 89	2010	June	9	2	6,362
Tallac Cr at Highway 89	2010	July	11	4	6,362
Tallac Cr at Highway 89	2010	August	10	4	6,362
Tallac Cr at Highway 89	2010	September	9	2	6,362
Tallac Cr at Highway 89	2010	October	5	5	6,362
Tallac Cr at Highway 89	2010	November	1	0	6,362
Tallac Cr at Highway 89	2011	June	4	2	6,362
Tallac Cr at Highway 89	2011	July	5	5	6,362
Tallac Cr at Highway 89	2011	August	5	4	6,362
Tallac Cr at Highway 89	2011	September	5	3	6,362
Tallac Cr at Highway 89	2011	October	4	2	6,362
Tallac Cr at Highway 89	2012	May	5	5	6,362
Tallac Cr at Highway 89	2012	June	5	10	6,362
Tallac Cr at Highway 89	2012	July	4	18	6,362

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Tallac Cr at Highway 89	2012	August	4	9	6,362
Tallac Cr at Highway 89	2012	September	3	6	6,362
Tallac Cr at Highway 89	2012	November	1	1	6,362
Tallac Cr at Highway 89	2013	May	1	0	6,362
Tallac Cr at Highway 89	2013	June	4	1	6,362
Tallac Cr at Highway 89	2013	July	3	6	6,362
Tallac Cr at Highway 89	2013	August	1	8	6,362
Tallac Cr at Highway 89	2013	September	5	11	6,362
Tallac Cr at Highway 89	2013	October	5	14	6,362
Trout Cr confl South Upper Truckee	2010	July	2	58	6,230
Trout Cr confl South Upper Truckee	2010	August	10	55	6,230
Trout Cr confl South Upper Truckee	2010	September	9	87	6,230
Trout Cr confl South Upper Truckee	2010	October	4	106	6,230
Trout Cr confl South Upper Truckee	2010	November	1	22	6,230
Trout Cr confl South Upper Truckee	2011	June	4	60	6,230
Trout Cr confl South Upper Truckee	2011	July	5	22	6,230
Trout Cr confl South Upper Truckee	2011	August	5	12	6,230
Trout Cr confl South Upper Truckee	2011	September	2	11	6,230
Trout Cr confl South Upper Truckee	2012	May	5	2	6,230
Trout Cr confl South Upper Truckee	2012	June	5	10	6,230
Trout Cr confl South Upper Truckee	2012	July	4	20	6,230
Trout Cr confl South Upper Truckee	2012	August	3	8	6,230
Trout Cr confl South Upper Truckee	2012	September	2	16	6,230
Trout Cr confl South Upper Truckee	2012	November	1	8	6,230
Trout Cr confl South Upper Truckee	2013	May	1	0	6,230
Trout Cr confl South Upper Truckee	2013	June	4	29	6,230
Trout Cr confl South Upper Truckee	2013	July	4	21	6,230
Trout Cr confl South Upper Truckee	2013	August	2	10	6,230
Trout Cr confl South Upper Truckee	2013	September	5	4	6,230
Trout Cr confl South Upper Truckee	2013	October	5	1	6,230
Trout Cr at Highway 50	2010	June	9	17	6,296
Trout Cr at Highway 50	2010	July	12	19	6,296

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Trout Cr at Highway 50	2010	August	12	27	6,296
Trout Cr at Highway 50	2010	September	8	8	6,296
Trout Cr at Highway 50	2010	October	4	7	6,296
Trout Cr at Highway 50	2010	November	1	2	6,296
Trout Cr at Highway 50	2011	June	3	26	6,296
Trout Cr at Highway 50	2011	July	5	11	6,296
Trout Cr at Highway 50	2011	August	8	16	6,296
Trout Cr at Highway 50	2011	September	3	7	6,296
Trout Cr at Highway 50	2012	May	5	4	6,296
Trout Cr at Highway 50	2012	June	5	9	6,296
Trout Cr at Highway 50	2012	July	4	26	6,296
Trout Cr at Highway 50	2012	August	3	13	6,296
Trout Cr at Highway 50	2012	September	2	133	6,296
Trout Cr at Highway 50	2012	November	2	2	6,296
Trout Cr at Highway 50	2013	May	1	2	6,296
Trout Cr at Highway 50	2013	June	4	6	6,296
Trout Cr at Highway 50	2013	July	4	21	6,296
Trout Cr at Highway 50	2013	August	2	7	6,296
Trout Cr at Highway 50	2013	September	5	2	6,296
Trout Cr at Highway 50	2013	October	5	1	6,296
Upper Truckee R., at Lake Tahoe	2013	July	1	42	6,227
Upper Truckee R., at R. Dr.	2013	July	5	13	6,296
Upper Truckee R., at R. Dr.	2013	August	5	12	6,296
Upper Truckee R., at R. Dr.	2013	September	5	4	6,296
Upper Truckee R., at R. Dr.	2013	October	6	1	6,296
Upper Truckee R., at R. Dr.	2013	November	1	1	6,296
Upper Truckee R., at Elks Club Dr.	2013	July	5	6	6,385
Upper Truckee R., at Elks Club Dr.	2013	August	5	5	6,385
Upper Truckee R., at Elks Club Dr.	2013	September	4	2	6,385
Upper Truckee R., at Elks Club Dr.	2013	October	6	1	6,385
Upper Truckee R., at Elks Club Dr.	2013	November	1	2	6,385
Upper Truckee R., at Hwy 50 Meyers	2013	July	5	5	6,398

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Upper Truckee R., at Hwy 50 Meyers	2013	August	5	12	6,398
Upper Truckee R., at Hwy 50 Meyers	2013	September	5	4	6,398
Upper Truckee R., at Hwy 50 Meyers	2013	October	6	2	6,398
Upper Truckee R., at Hwy 50 Meyers	2013	November	1	0	6,398
Upper Truckee R., at Grass Lake Rd.	2013	July	3	35	6,565
Upper Truckee R., at Grass Lake Rd.	2013	August	5	7	6,565
Upper Truckee R., at Grass Lake Rd.	2013	September	5	6	6,565
Upper Truckee R., at Grass Lake Rd.	2013	October	6	1	6,565
Upper Truckee R., at Grass Lake Rd.	2013	November	1	0	6,565
Upper Truckee R., at bridge Hawley Grade	2013	July	5	38	6,598
Upper Truckee R., at bridge Hawley Grade	2013	August	5	6	6,598
Upper Truckee R., at bridge Hawley Grade	2013	September	5	1	6,598
Upper Truckee R., at bridge Hawley Grade	2013	October	6	1	6,598
Upper Truckee R., at bridge Hawley Grade	2013	November	1	0	6,598
Upper Truckee R., above swim hole	2013	July	4	9	8,468
Upper Truckee R., above swim hole	2013	August	5	1	8,468
Upper Truckee R., above swim hole	2013	September	5	5	8,468
Upper Truckee R., above swim hole	2013	October	6	1	8,468
Upper Truckee R., above swim hole	2013	November	1	0	6,959
Upper Truckee River, Meiss Meadow, lower	2013	October	1	0	8,363
Upper Truckee River, Meiss Meadow, lower	2013	November	1	1	8,363
Upper Truckee R., Meiss Meadow, upper	2013	July	1	10	8,468
Upper Truckee R., Meiss Meadow, upper	2013	August	1	4	8,468
Upper Truckee R., Meiss Meadow, upper	2013	September	1	0	8,468
Upper Truckee R., Meiss Meadow, upper	2013	October	1	0	8,468
Upper Truckee R., Meiss Meadow, upper	2013	November	1	0	8,468
Truckee R. Hydrologic Unit 635					
Donner Cr, above Truckee R.	2013	August	3	3	5,997
Donner Cr, above Truckee R.	2013	September	3	20	5,997
Donner Cr, above Truckee R.	2013	October	3	5	5,997
Donner Cr, above Truckee R.	2013	November	1	0	5,997
Squaw Cr, above Truckee R.	2013	August	3	2	5,997

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Squaw Cr, above Truckee R.	2013	September	3	1	5,997
Squaw Cr, above Truckee R.	2013	October	3	0	5,997
Squaw Cr, above Truckee R.	2013	November	1	0	5,997
Truckee R., above TTSA	2013	July	1	0	5,797
Truckee R., above TTSA	2013	August	2	1	5,797
Truckee R., below Town of Truckee	2013	August	1	1	5,797
Truckee R., below Town of Truckee	2013	September	3	2	6,342
Truckee R., below Town of Truckee	2013	October	3	0	5,797
Truckee R., below Town of Truckee	2013	November	1	0	5,797
Truckee R., above Squaw Cr	2013	August	3	2	6,342
Truckee R., above Squaw Cr	2013	September	3	1	6,342
Truckee R., above Squaw Cr	2013	October	3	1	6,342
Truckee R., above Squaw Cr	2013	November	1	1	6,342
Truckee R., above Bear Cr	2013	August	3	1	6,198
Truckee R., above Bear Cr	2013	September	3	1	6,198
Truckee R., above Bear Cr	2013	October	3	0	6,198
Truckee R., above Bear Cr	2013	November	1	0	6,198
Truckee R., above R. Ranch	2013	July	1	20	6,198
Truckee R., above R. Ranch	2013	August	3	3	6,198
Truckee R., above R. Ranch	2013	September	3	1	6,198
Truckee R., above R. Ranch	2013	October	3	1	6,198
Truckee R., above R. Ranch	2013	November	1	0	6,198
Susanville Hydrologic Unit 637					
Brockman Slough at Center Road	2012	June	1	0	4,199
Brockman Slough at Center Road	2012	July	4	22	4,199
Brockman Slough at Center Road	2012	August	5	29	4,199
Brockman Slough at Center Road	2012	October	3	81	4,199
Long Valley Cr, downstream	2011	December	1	1	4,199
Long Valley Cr, upstream	2008	June	1	11	4,596
Long Valley Cr, upstream	2008	October	1	1	4,596
Long Valley Cr, upstream	2009	January	1	2	4,596
Long Valley Cr, upstream	2009	March	1	0	4,596

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Long Valley Cr, upstream	2009	September	1	2	4,596
Long Valley Cr, upstream	2010	June	1	2	4,596
Long Valley Cr, upstream	2010	September	1	0	4,596
Long Valley Cr, upstream	2011	June	1	98	4,596
Susan R. nr Litchfield	2003	September	1	170	4,085
Susan R. nr Litchfield	2003	December	1	1	4,085
Susan R. nr Litchfield	2004	March	1	19	4,085
Susan R. nr Litchfield	2004	June	1	58	4,085
Susan R. nr Litchfield	2004	October	1	13	4,085
Susan R. nr Litchfield	2005	January	1	5	4,085
Susan R. nr Litchfield	2005	April	1	52	4,085
Susan R. nr Litchfield	2005	July	1	48	4,085
Susan R. nr Litchfield	2008	February	1	4	4,085
Susan R. nr Litchfield	2008	June	1	98	4,085
Susan R. nr Litchfield	2008	October	1	10	4,085
Susan R. nr Litchfield	2009	January	1	0	4,085
Susan R. nr Litchfield	2009	March	1	18	4,085
Susan R. nr Litchfield	2009	September	1	64	4,085
Susan R. nr Litchfield	2010	June	1	38	4,085
Susan R. nr Litchfield	2010	September	1	0	4,085
Susan R. nr Litchfield	2011	June	1	105	4,085
Susan R. nr Litchfield	2011	December	1	4	4,085
Susan R. at Lassen St	2008	February	1	1	4,252
Susan R. at Lassen St	2011	June	1	20	4,800
Susan R. at Lassen St	2011	December	1	1	4,252
Susan R., above confl w/ Willard Cr	2003	September	1	8	4,800
Susan R., above confl w/ Willard Cr	2003	December	1	2	4,800
Susan R., above confl w/ Willard Cr	2004	March	1	2	4,800
Susan R., above confl w/ Willard Cr	2004	June	1	24	4,800
Susan R., above confl w/ Willard Cr	2004	October	1	17	4,800
Susan R., above confl w/ Willard Cr	2005	January	1	1	4,800
Susan R., above confl w/ Willard Cr	2005	April	1	9	4,800

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Susan R., above confl w/ Willard Cr	2005	July	1	29	4,800
Susan R., above confl w/ Willard Cr	2008	February	1	0	4,800
Susan R., above confl w/ Willard Cr	2011	June	1	79	4,800
Susan R., above confl w/ Willard Cr	2011	December	1	1	4,800
Susan R. at Leavitt Lane	2012	June	1	4	4,098
Susan R. at Leavitt Lane	2012	July	5	4	4,098
Susan R. at Leavitt Lane	2012	August	5	22	4,098
Susan R. at Leavitt Lane	2012	October	3	15	4,098
Susan R. at Chappuis Lane	2012	June	1	264	4,078
Susan R. at Chappuis Lane	2012	July	5	133	4,078
Susan R. at Chappuis Lane	2012	August	5	72	4,078
Susan R. at Chappuis Lane	2012	October	3	285	4,199
Susan R. at Johnsonville Road	2012	June	1	8	4,199
Susan R. at Johnsonville Road	2012	July	4	26	4,199
Susan R. at Johnsonville Road	2012	August	3	20	4,199
Susan R. at Hwy 36	2012	June	1	51	4,199
Susan R. at Hwy 36	2012	July	4	41	4,199
Susan R. at Hwy 36	2012	August	5	31	4,199
Susan R. at Hwy 36	2012	October	3	17	4,199
Surprise Valley Hydrologic Unit 641					
Bidwell Cr, below Mill Cr nr Fort Bidwell	2008	February	1	0	4,898
Bidwell Cr, below Mill Cr nr Fort Bidwell	2008	June	1	1	4,898
Bidwell Cr, below Mill Cr nr Fort Bidwell	2008	October	1	15	4,898
Bidwell Cr, below Mill Cr nr Fort Bidwell	2009	January	1	6	4,898
Bidwell Cr, below Mill Cr nr Fort Bidwell	2009	April	1	2	4,898
Bidwell Cr, below Mill Cr nr Fort Bidwell	2009	September	1	5	4,898
Bidwell Cr, below Mill Cr nr Fort Bidwell	2010	June	1	3	4,898
Bidwell Cr, below Mill Cr nr Fort Bidwell	2010	September	1	0	4,898
Cedar Cr, below Cedarville	2008	June	1	3	4,636
Cedar Cr, below Cedarville	2009	April	1	10	4,636
Cedar Cr, below Cedarville	2010	June	1	9	4,636
Cedar Cr, abv Cedarville	2003	September	1	81	4,806

Station Name	Year	Month	Samples / Month	Monthly Geomean (Fecal Coliform / 100ml)	Elevation (feet)
Cedar Cr, abv Cedarville	2003	December	1	1	4,806
Cedar Cr, abv Cedarville	2004	March	1	1	4,806
Cedar Cr, abv Cedarville	2004	June	1	28	4,806
Cedar Cr, abv Cedarville	2004	October	1	22	4,806
Cedar Cr, abv Cedarville	2005	April	1	2	4,806
Cedar Cr, abv Cedarville	2005	July	1	80	4,806
Cedar Cr, abv Cedarville	2008	February	1	0	4,806
Cedar Cr, abv Cedarville	2008	June	1	3	4,806
Cedar Cr, abv Cedarville	2008	October	1	19	4,806
Cedar Cr, abv Cedarville	2009	January	1	0	4,806
Cedar Cr, abv Cedarville	2009	April	1	0	4,806
Cedar Cr, abv Cedarville	2009	September	1	62	4,806
Cedar Cr, abv Cedarville	2010	June	1	0	4,806
Cedar Cr, abv Cedarville	2010	September	1	10	4,806
Mill Cr, below Lake City	2008	June	1	0	4,563
Mill Cr, below Lake City	2009	January	1	1	4,563
Mill Cr, below Lake City	2009	April	1	0	4,563
Mill Cr, below Lake City	2010	June	1	2	4,563
Mill Cr, abv Lake City	2008	February	1	0	4,613
Mill Cr, abv Lake City	2008	June	1	0	4,613
Mill Cr, abv Lake City	2008	October	1	5	4,613
Mill Cr, abv Lake City	2009	January	1	2	4,613
Mill Cr, abv Lake City	2009	April	1	1	4,613
Mill Cr, abv Lake City	2009	September	1	5	4,613
Mill Cr, abv Lake City	2010	June	1	2	4,613
Mill Cr, abv Lake City	2010	September	1	1	4,613

ENCLOSURE 2

This page is intentionally left blank.

Freshwater Recreational Water Quality Objectives			
Regional Water Board	<u>Indicator Organism</u>	<u>Geometric Mean^a</u>	<u>Maximum</u>
North Coast (1)	Fecal Coliform	50/100 mL ^b	400/100 mL ^c
San Francisco Bay (2)	Fecal Coliform	200/100 mL	400/100 mL ^d
	Total Coliform	240/100 mL ^b	10,000/100 mL
	Enterococcus ^e	33/100 mL	61-151/100 mL
	<i>E. coli</i> ^e	126/100 mL	235-576/100 mL
Central Coast (3)	Fecal Coliform	200/100 mL	400/100 mL ^c
Los Angeles (4)	<i>E. coli</i>	126/100 mL ^h	235/100 mL
	<i>E. coli</i> (LREC-1)	126/100 mL	576/100 mL
Central Valley (5)			
o Sacramento and San Joaquin Basins	Fecal Coliform	200/100 mL	400/100 mL
- Folsom Lake	Fecal Coliform	100/100 mL	200/100 mL
o Tulare Lake Basin	Fecal Coliform	200/100 mL	400/100 mL
Lahontan (6) ^g	Fecal Coliform	20/100 mL	40/100 mL ^c
Colorado River (7) ^h			
o All of Basin	<i>E. coli</i>	126/100 mL	400/100 mL
	Enterococci	33/100 mL	100/100 mL
	Fecal Coliform	200/100 mL	400/100 mL ^c
o Colorado River	<i>E. coli</i>		235/100 mL
	Enterococci		61/100 mL
Santa Ana (8)	Fecal Coliform	200/100 mL	400/100 mL ^c
San Diego (9)	Fecal Coliform	200/100 mL	400/100 mL ^c
	Enterococci ^e	33/100 mL	61-151/100 mL ^f
	<i>E. coli</i> ^e	126/100 mL	235-576/100 mL ^f
^a Based on at least 5 samples over a 30-day period (cfu/mL). ^b Based on median of samples, not geometric mean. ^c 10% of samples cannot exceed maximum (cfu/mL). ^d Based on 90 th percentile value (cfu/mL). ^e Included in Basin Plans as supplemental criteria to either fecal coliform or total coliform criteria. ^f Maximum values determined based on frequency and density of recreational use. ^g Basin Plan also contains a narrative objective that states that waters shall not contain concentrations of coliform organisms attributable to anthropogenic sources, including human and livestock wastes. ^h Based on at least 4 samples over a 30-day period.			

This page is intentionally left blank.

ENCLOSURE 3

This page is intentionally left blank.

Bacteria Monitoring in the Eastern Sierra Nevada Summary of Results for 2011

STAFF REPORT



March 27, 2012

Primary Authors:

Carly Nilson
Thomas Suk

Contributors:

Alanna Misico
Kelly Huck
Bruce Warden
Lisa Petrusa
Laurie Scribe



Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150

Contents

SUMMARY	1
INTRODUCTION.....	1
METHODS	2
RESULTS	4
Carson River sites.....	4
West Walker River sites	6
Sardine Creek (Sonora Pass) sites (Toiyabe National Forest).....	9
Bridgeport Area sites.....	12
Huntoon Valley sites (Swauger Creek)	13
Bridgeport Valley sites	14
Upper Buckeye sites.....	16
Virginia Creek and Lee Vining Creek.....	18
Mammoth Creek sites	19
Crooked Creek sites (Inyo National Forest).....	22
Golden Trout Camp (Inyo National Forest).....	23
Horseshoe Meadow Sites (Inyo National Forest)	25
DISCUSSION	29
ACKNOWLEDGEMENTS	30
REFERENCES.....	30
<i>Appendix A</i>	<i>31</i>

SUMMARY

Staff of the California Regional Water Quality Control Board, [Lahontan Region](#), collected water samples from 37 streams in the eastern Sierra Nevada from spring through autumn of 2011. Samples were analyzed for two bacterial indicators (fecal coliform and *E. coli*), and results were compared to relevant state water quality standards. This report summarizes the project, including its purpose, monitoring questions, site locations, methods, and analytical results. The results document that the highest concentrations of fecal coliform bacteria typically occurred at sites where rangeland livestock grazing is the predominant land use at the time of sampling. All data (including results for both fecal coliform and *E. coli*, and associated metadata) are now available to the public on the Internet via the California Environmental Data Exchange Network ([CEDEN](#)).

INTRODUCTION

For the purposes of protecting water quality and allocating water uses in California, the Legislature in 1967 established the [State Water Resources Control Board](#) and [nine regional water boards](#). The Lahontan Region is located in eastern California, from the Oregon border in the north to the San Bernardino mountains and eastern Los Angeles County in the south. (A [map of the region](#), and other background information, is available at the Region's [website](#).)

The Region implements numerous [programs](#) to protect and enhance water quality. This project was initiated by the Region's [Nonpoint Source Program](#), with assistance from its Total Maximum Daily Load ([TMDL](#)) program, its Surface Water Ambient Monitoring Program ([SWAMP](#)), and other programs.

The purpose of the current project is twofold: 1) to characterize concentrations of bacterial indicators at targeted locations representing a variety of land uses; and 2) to provide numeric data on the relative concentrations of fecal coliform vs. *E. coli* at targeted stream sites.

The fecal coliform results can be immediately used in many ways. Fecal coliform results can be directly compared to existing state [water quality objectives](#) in order to assess the status and trends of bacterial water quality at targeted sites (for example, by Nonpoint Source Program staff as they develop waivers for rangeland grazing operations, by TMDL staff as they design remedial programs to address known impairments, by Grants Program staff as they seek cooperative partners to install management practices to reduce bacterial discharges, by Planning Program staff as they conduct water quality assessments (e.g., Water Boards' Clean Water Act Section 303(d)/305(b) "[Integrated](#)

[Report](#)”), and by Enforcement Program staff as they investigate complaints or perform follow-up on exceedances as appropriate.

Because the Region currently has no numeric water quality objectives for *E. coli*, a direct comparison of the *E. coli* results to state standards cannot be made at this time. However, it is expected that the *E. coli* data collected by this project will assist in current efforts to develop appropriate water quality objectives for *E. coli*.

The specific monitoring questions are as follows:

1. Do fecal coliform concentrations at targeted sites comply with the water quality objectives for bacteria as contained in the *Water Quality Control Plan for the Lahontan Region* (“[Basin Plan](#)”)?
2. Where fecal coliform is detected, what are the accompanying concentrations of *E. coli*?

Specific waterborne pathogens (such as *Cryptosporidium*, *Giardia*, *Campylobacter*, etc.) are very difficult, expensive, or even impossible to monitor on a routine basis, and the methods for monitoring them are not well standardized or widely accepted. Therefore, cost-effective bacterial indicators such as fecal coliform and *E. coli* have long been used to evaluate the risk of water contamination by enteric pathogens. While the presence of fecal coliform bacteria and *E. coli* do not necessarily indicate in every case that water is unsafe for human uses, they are widely accepted measures of bacterial water quality because they signal fecal contamination. For these reasons, the USEPA continues to recommend the use and enforcement of standards for bacterial water quality that rely on bacterial indicator organisms.

This report presents only the fecal coliform results, since those can be directly compared to existing water quality objectives. All results (for both fecal coliform and *E. coli*) and associated metadata are available to the public via the California Environmental Data Exchange Network ([CEDEN](#)).

METHODS

Sites were selected to include a variety of land uses, including residential housing and developed resorts that utilize septic systems for waste disposal (e.g., Willow Springs area), recreation camps that utilize pit toilets and/or closed systems for waste disposal (e.g., Camp Azusa, Golden Trout Camp), rangelands grazed by livestock (on both federal and nonfederal lands), mixed land uses (e.g., Mammoth Lakes area, East Walker River at Bridgeport, Swauger Creek above Huntoon Valley), and several “control sites” with few or no known or potential bacterial discharges. Sites were selected based on ease of access (i.e., highway rights-of-way and/or public lands, and accessible via

roads, without long hikes, in order to meet standard 8-hour “holding times” for bacterial analyses). The 37 sample sites are listed at Appendix A.

Samples were collected and transported by Water Board staff following standard collection, preservation, and chain-of-custody procedures. All applicable quality assurance and quality control (QA/QC) procedures were followed (LRWQCB 2011, SWAMP 2008). Samples were analyzed at the laboratory following *Standard Methods for the Examination of Water and Wastewater* (2006). Most samples were analyzed at the Region’s in-house laboratory at South Lake Tahoe, CA, using standard membrane filter techniques (i.e., fecal coliform by SM9222D and *E. coli* by SM9222G via a two-step membrane filtration process). Some samples were analyzed at the Inyo County Health Services laboratory in Independence, CA, using a 15-tube multiple tube procedure (fecal coliform by SM9221E). All results and associated metadata are available to the public via the on-line California Environmental Data Exchange Network ([CEDEN](#)).

The *Water Quality Control Plan for the Lahontan Region* (“[Basin Plan](#)”) contains the following water quality objectives for bacteria in surface waters of the Region:

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.*

Where feasible, effort was made to sample five times per calendar month. Log means were calculated using electronic computational routines developed by Dr. Bruce Warden of the Lahontan Water Board’s staff. The data computations for the tables below are located in the Region’s electronic files at: *S:\Eastern Sierra Bacteria Study\2011 Field season data\FINAL R6-NPS_11.23.2011 AES.xls* and *S:\Eastern Sierra Bacteria Study\2011 Field season data\FINAL SWAMP sites_11.23.2011 AES.xls*.

To assess compliance with the Basin Plan’s water quality objectives, the data are analyzed for 30-day periods, not specific to a calendar month. The tables below present the 30-day log mean results assessed relative to the 20/100ml objective, and also in some cases the results for the 90th percentile (i.e., where exceedances of the 40/100ml objective were found). For rangeland grazing sites, post-grazing data are shaded in blue, to depict samples collected after livestock were removed at the end of the grazing season.

Field crews were instructed to note whether livestock was observed upstream of the sampling location at the time of sample collection. A “No” to this question does not mean definitively that no livestock were present anywhere upstream; it means only that livestock were not observed upstream of the site at the time of sampling.

RESULTS

The results are presented below, generally in order from north to south. A list of sites is provided at Appendix A.

Carson River sites

Two sites were sampled along the two forks of the Carson River, including: 1) West Fork Carson River at Paynesville Bridge; and 2) East Fork Carson River at the USGS gaging station. The sites are shown in Figure 1.

The West Fork Carson at the Paynesville Bridge sampling site is located a few miles downstream of several ranches. Due to access issues, staff was not able to determine the status of grazing operations upstream past the sampling location. For many of the dates sampled, grazing information was not available N/A).

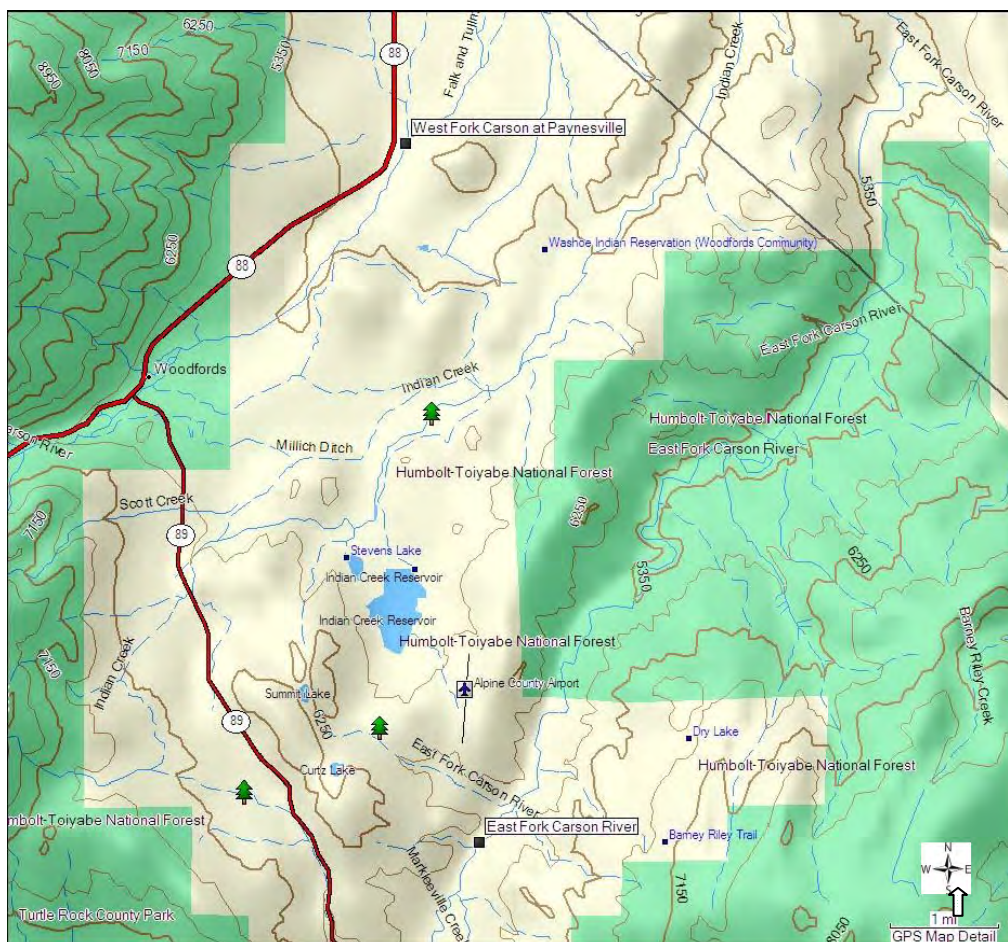


Figure 1. Map of Carson River sampling sites

West Fork Carson River at Paynesville Bridge (633WFCB02)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
6/9/2011	7/9/2011	10	38	58	294	cattle
6/14/2011	7/14/2011	9	294	61	294	N/A
6/14/2011	7/14/2011	8	296	50	139	N/A
6/27/2011	7/27/2011	13	15	40	75	N/A
6/27/2011	7/27/2011	12	25	43	76	N/A
6/28/2011	7/28/2011	13	60	38	75	N/A
6/28/2011	7/28/2011	12	35	37	76	N/A
6/28/2011	7/28/2011	11	33	37	76	N/A
7/6/2011	8/5/2011	12	72	34	76	No
7/6/2011	8/5/2011	11	68	31	76	No
7/19/2011	8/18/2011	13	92	26	74	cattle
7/19/2011	8/18/2011	12	76	23	63	cattle
7/21/2011	8/20/2011	11	64	21	54	cattle
7/21/2011	8/20/2011	10	54	19	45	cattle
7/26/2011	8/25/2011	10	14	19	46	cattle
7/26/2011	8/25/2011	9	14	20	48	cattle
7/28/2011	8/27/2011	8	16	21	50	cattle
7/28/2011	8/27/2011	7	14	21	52	cattle
8/4/2011	9/3/2011	7	20	25	52	N/A
8/4/2011	9/3/2011	6	20	26	54	N/A
8/9/2011	9/8/2011	7	44	37	80	N/A
8/16/2011	9/15/2011	8	12	58	241	N/A
8/18/2011	9/17/2011	7	11	73	244	N/A
8/23/2011	9/22/2011	9	63	109	239	N/A
8/30/2011	9/29/2011	10	40	100	236	N/A
9/6/2011	10/6/2011	9	80	110	239	N/A
9/8/2011	10/8/2011	8	80	115	241	N/A
9/13/2011	10/13/2011	9	258	95	239	N/A
9/13/2011	10/13/2011	8	234	84	171	N/A
9/21/2011	10/21/2011	9	132	57	134	N/A
9/21/2011	10/21/2011	8	116	51	124	N/A
9/21/2011	10/21/2011	7	144	45	94	N/A
9/29/2011	10/29/2011	8	48	32	52	N/A
9/29/2011	10/29/2011	7	60	30	50	N/A
10/12/2011	11/11/2011	6	43	27	42	cattle
10/12/2011	11/11/2011	5	40	24	35	cattle
10/20/2011	11/19/2011	4	27	21	26	N/A
10/20/2011	11/19/2011	3	20	20	23	N/A
10/26/2011	11/25/2001	2	16	20	23	N/A
10/26/2011	11/25/2011	1	24	24	24	N/A

East Fork Carson River at USGS Gaging Station (632ECR005)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	Livestock Upstream
1/27/2011	2/26/2011	1	0	1	No
3/17/2011	4/16/2011	2	3	3	No
4/12/2011	5/12/2011	1	3	3	No
5/19/2011	6/18/2011	2	1	2	No
6/9/2011	7/9/2011	1	6	6	cattle
7/20/2011	8/19/2011	2	15	15	cattle
9/7/2011	10/6/2011	1	5	5	cattle

West Walker River sites

Several sites were sampled along the West Walker River, including (from downstream to upstream): 1) West Walker River at Topaz; 2) West Walker River near Coleville; 3) West Walker River above confluence with Little Walker River; 4) Little Walker above Hot Creek; 5) West Walker River above the commercial pack station; and 6) Hot Creek above Little Walker River. These sites are shown in Figure 2

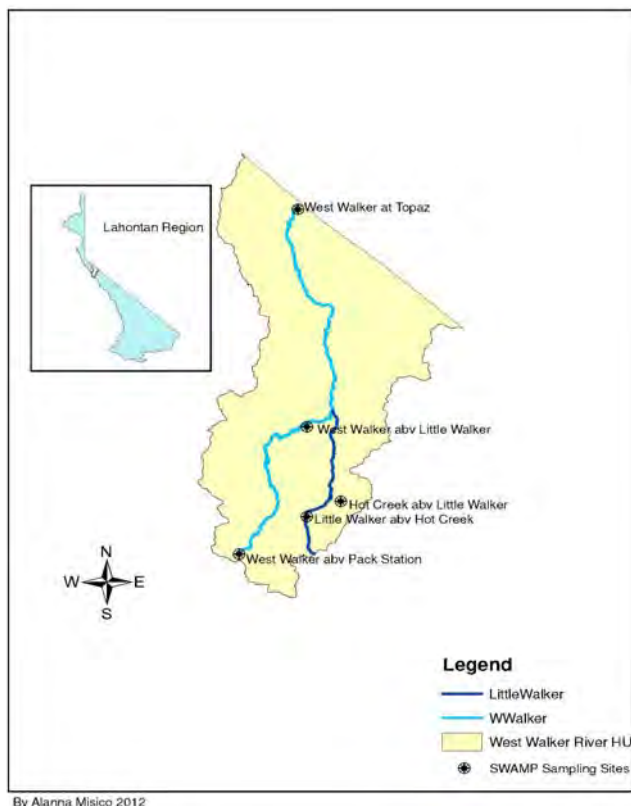


Figure 2. Map of West Walker River HU sampling sites

West Walker River at Topaz (631WWK008)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
4/29/2011	5/29/2011	2	0	4	14	No
5/31/2011	6/30/2011	2	15	17	20	No
6/20/2011	7/20/2011	2	20	14	19	cattle
7/7/2011	8/6/2011	2	10	17	28	cattle
8/1/2011	8/31/2011	1	30	30	30	cattle
9/9/2011	10/9/2011	6	16	12	26	cattle
9/19/2011	10/19/2011	7	36	10	34	cattle
9/27/2011	10/27/2011	8	13	10	38	cattle
9/29/2011	10/29/2011	7	12	10	40	No
10/4/2011	11/3/2011	6	10	9	42	No
10/7/2011	11/6/2011	5	4	9	43	No
10/13/2011	11/12/2011	4	32	11	45	No
10/19/2011	11/18/2011	3	1	8	43	No
10/21/2011	11/20/2011	2	51	23	47	No
10/27/2011	11/26/2011	1	10	10	9	No
12/12/2011	1/11/2012	1	2	2	2	No

West Walker River near Coleville (631WWK001)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	Livestock Upstream
1/20/2011	2/19/2011	1	0	0	No
3/8/2011	4/7/2011	1	0	0	No
4/27/2011	5/27/2011	2	0	0	No
5/23/2011	6/22/2011	2	0	0	No
6/15/2011	7/15/2011	2	0	0	No
7/7/2011	8/6/2011	2	25	14	No
8/1/2011	8/31/2011	1	8	8	No
9/19/2011	10/19/2011	7	0	1	No
9/27/2011	10/27/2011	8	1	1	No
9/29/2011	10/29/2011	7	0	1	No
10/4/2011	11/3/2011	6	0	1	No
10/7/2011	11/6/2011	5	0	1	No
10/13/2011	11/12/2011	4	1	1	No
10/19/2011	11/18/2011	3	0	1	No
10/21/2011	11/20/2011	2	0	1	No
10/27/2011	11/26/2011	1	2	2	No
12/12/2011	1/11/2012	1	1	1	No

West Walker River above the confluence with the Little Walker River (631WWK007)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100 ml)	30-day log normalized mean (20/100 ml)	Livestock Upstream
1/18/2011	2/17/2011	1	0	0	No
4/29/2011	5/29/2011	1	0	0	No
5/31/2011	6/30/2011	2	0	2	No
6/20/2011	7/20/2011	2	5	5	No
7/5/2011	8/4/2011	2	5	3	No
8/1/2011	8/31/2011	1	2	2	No
9/29/2011	10/29/2011	1	1	1	No

West Walker River above the commercial Pack Station (631WWK010)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	Livestock Upstream
1/18/2011	2/17/2011	1	0	0	No
4/29/2011	5/29/2011	1	0	0	No
5/31/2011	6/30/2011	1	0	0	No
6/20/2011	7/20/2011	1	0	0	No
7/5/2011	8/4/2011	1	2	2	No
8/1/2011	8/31/2011	1	0	0	No
9/29/2011	10/29/2011	1	1	1	No

Little Walker above Hot Creek (631LWK004)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
1/18/2011	2/17/2011	1	1	0	1	No
4/29/2011	5/29/2011	1	0	0	0	No
5/31/2011	6/30/2011	2	0	2	5	No
6/20/2011	7/20/2011	2	6	20	63	No
7/5/2011	8/4/2011	2	69	33	64	No
8/1/2011	8/31/2011	1	16	16	16	No
9/29/2011	10/29/2011	1	525	525	525	cattle

Hot Creek above Little Walker (631HOT001)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
1/18/2011	2/17/2011	1	3	3	3	No
4/28/2011	5/28/2011	1	0	0	0	No
4/29/2011	5/29/2011	1	0	0	0	No
5/31/2011	6/30/2011	2	5	8	11	No
6/20/2011	7/20/2011	2	12	76	438	No
7/5/2011	8/4/2011	2	485	156	442	No
8/1/2011	8/31/2011	1	50	50	50	No
9/29/2011	10/29/2011	1	588	588	588	cattle

Sardine Creek (Sonora Pass) sites (Toiyabe National Forest)

Two sites were sampled along Sardine Creek, near Sonora Pass, as shown in Figure 3. Both sites can be accessed from Highway 108 and are in close proximity to the road. The first site (“above McKay”) is located in a meadow, while the second site (“below McKay”) is a short distance downstream and located near informal but popular camping and fishing spots. Snow at the beginning of October prevented access up the road to sample sites.

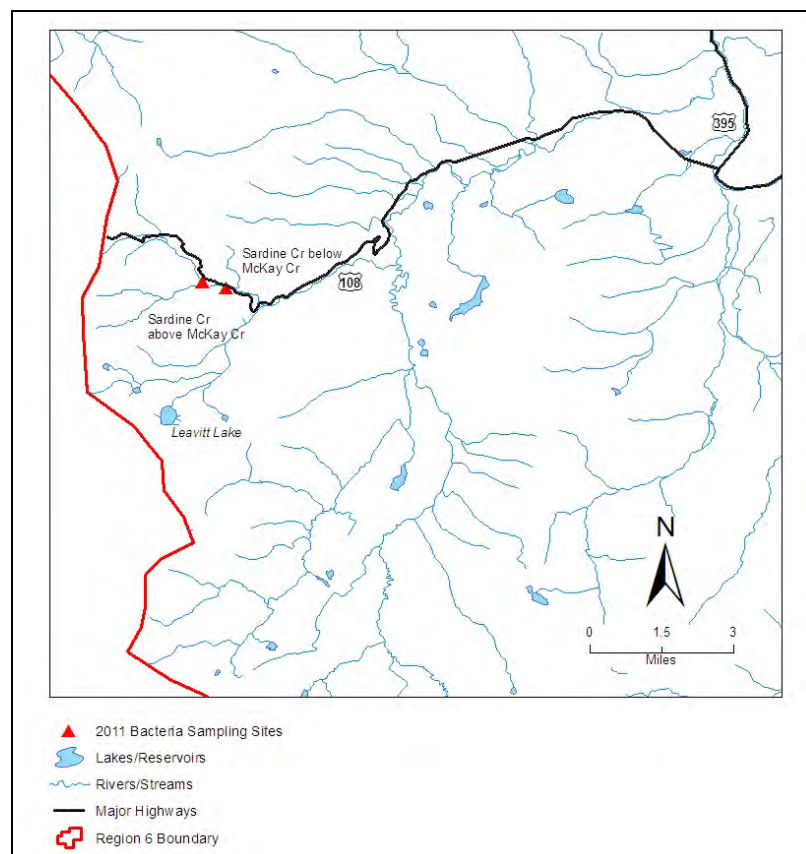


Figure 3. Map of Sardine Creek sampling sites

Sardine Creek above McKay (631SDCB02)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
8/17/2011	9/16/2011	9	41	23	52	No
8/23/2011	9/22/2011	8	40	21	52	cattle
8/29/2011	9/28/2011	8	38	20	52	cattle
8/30/2011	9/29/2011	7	58	18	53	cattle
8/31/2011	9/30/2011	6	0	15	39	No
9/7/2011	10/7/2011	5	14	26	41	No
9/8/2011	10/8/2011	4	28	30	43	No
9/9/2011	10/9/2011	3	50	31	45	No
9/15/2011	10/15/2011	2	25	24	25	No
9/21/2011	10/21/2011	1	24	24	24	No
10/13/2011	11/12/2011	4	2	4	37	No
10/19/2011	11/15/2011		3			No
10/21/2011	11/20/2011		1			No
10/27/2011	11/26/2011		52			No



Cows present downstream in meadow at Sardine Creek above McKay (8/23/11, CMN)



Cows crossing Sardine Creek above McKay (8/23/11, CMN)

Sardine Creek below McKay (631SDCB01)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100ml)	30-day log normalized mean (20/100 ml)	Livestock Upstream
8/17/2011	9/16/2011	9	9	10	No
8/23/2011	9/22/2011	9	75	11	No
8/29/2011	9/28/2011	8	5	9	No
8/30/2011	9/29/2011	7	4	10	cattle
8/31/2011	9/30/2011	6	6	11	No
9/7/2011	10/7/2011	5	5	12	No
9/8/2011	10/8/2011	4	11	16	No
9/9/2011	10/9/2011	3	18	18	cattle
9/15/2011	10/15/2011	2	18	17	No
9/21/2011	10/21/2011	1	17	17	No
10/13/2011	11/12/2011	4	5	4	No
10/19/2011	11/15/2011		7		No
10/21/2011	11/20/2011		5		No
10/27/2011	11/26/2011		1		No



Cows present on bank at Sardine Creek below McKay (8/30/11, CMN)



Cows present on bank at Sardine Creek below McKay (8/30/11, CMN)

Bridgeport Area sites

Three groups of sites were sampled in the Bridgeport area, including: 1) Huntoon Valley; 2) Bridgeport Valley; and 3) Upper Buckeye. Figure 4 depicts the location of these sites.

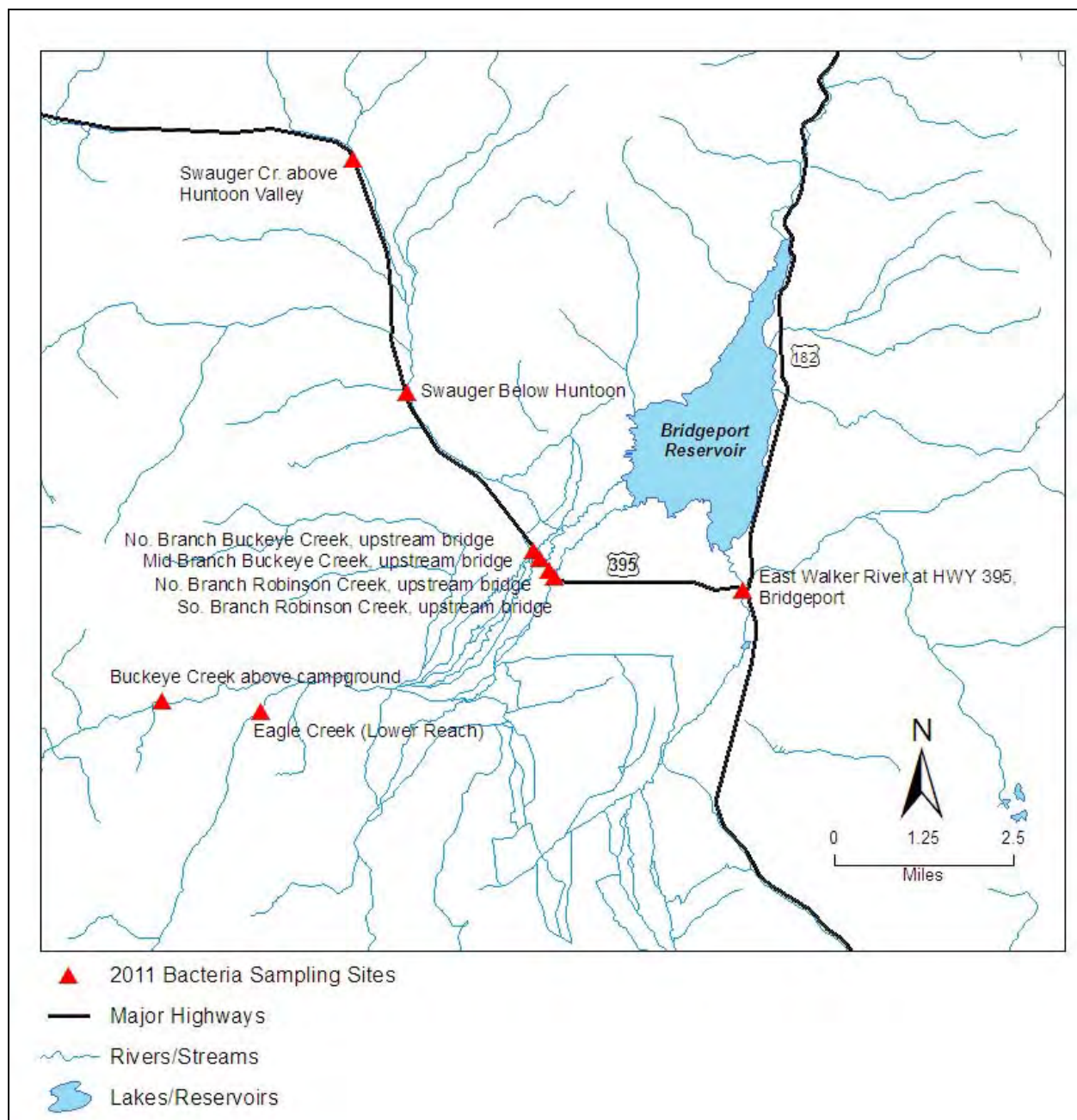


Figure 4. Map of Bridgeport Area sites: Huntoon Valley, Bridgeport Valley, and Upper Buckeye sites

Huntoon Valley sites (Swauger Creek)

The Huntoon Valley is located just north of the Bridgeport Valley, along Highway 395. It includes two sites along Swauger Creek (one above the Huntoon Valley ranching operation and one below).

Swauger Creek above Huntoon Valley (630SWA001) (above ranch)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100ml)	Livestock Upstream
7/14/2011	8/13/2011	4	5	22	33	No
7/27/2011	8/26/2011	6	18	31	53	No
8/1/2011	8/31/2011	5	60	34	54	No
8/10/2011	9/9/2011	4	46	29	42	No
8/16/2011	9/15/2011	4	32	28	34	No
8/17/2011	9/16/2011	3	16	26	34	No
8/23/2011	9/22/2011	3	32	33	35	No
9/15/2011	10/15/2011	2	35	34	35	No
9/19/2011	10/19/2011	1	33	33	33	No
10/27/2011	11/26/2011	2	7	5	5	No
11/17/2011	12/17/2011	1	3	3	3	No

Swauger Creek below Huntoon Valley (630SWA005) (below ranch)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100ml)	30-day log normalized mean (20/100ml)	Livestock Upstream
7/10/2011	8/9/2011	4	260	303	cattle
7/14/2011	8/13/2011	4	215	299	cattle
7/27/2011	8/26/2011	6	420	307	cattle
8/1/2011	8/31/2011	5	360	288	cattle
8/10/2011	9/9/2011	4	245	272	cattle
8/16/2011	9/15/2011	3	145	282	cattle
8/17/2011	9/16/2011	3	100	387	cattle
8/23/2011	9/22/2011	3	1,550	526	cattle
9/15/2011	10/15/2011	2	375	306	cattle
9/19/2011	10/19/2011	1	250	250	cattle
10/27/2011	11/26/2011	1	575	575	cattle
11/17/2011	12/17/2011	1	12	12	No



Cows grazing along Swauger Creek (Huntoon Valley) (7/13/2011)



Cows standing in Swauger Creek (Huntoon Valley) (7/13/2011)

Bridgeport Valley sites

Five sites were sampled in the Bridgeport Valley: two sites on Robinson Creek and two sites on Buckeye Creek (both located on Highway 395, north of Bridgeport), and one site on the East Walker River at the southern end of Bridgeport. (All five sites were sampled just upstream of the highway overcrossing bridges.) The sites at Buckeye and Robinson creeks could not be sampled at times throughout the summer, due to road construction along Hwy 395, which precluded access.

North Buckeye Creek @ Hwy 395 (630BUC004)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
5/31/2011	6/30/2011	2	15	71	306	cattle
6/13/2011	7/13/2011	2	338	324	335	cattle
7/5/2011	8/4/2011	2	310	255	300	cattle
8/1/2011	8/31/2011	1	210	210	210	cattle
9/9/2011	10/9/2011	2	122	70	114	cattle
10/7/2011	11/6/2011	2	40	40	40	cattle
10/13/2011	11/12/2011	1	40	40	40	No

Mid Buckeye Creek @ Hwy 395 (630BUC005)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
5/31/2011	6/30/2011	2	0	19	338	cattle
6/13/2011	7/13/2011	2	375	352	371	cattle
7/5/2011	8/4/2011	2	330	199	196	cattle
8/1/2011	8/31/2011	2	120	173	224	cattle
9/9/2011	10/9/2011	2	250	229	246	cattle
10/7/2011	11/6/2011	2	210	92	86	cattle
10/13/2011	11/12/2011	1	40	40	40	No

North Robinson Creek @ Hwy 395 (630RBS007)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100ml)	30-day log normalized mean (20/100ml)	90th percentile (40/100 ml)	Livestock Upstream
5/31/2011	6/30/2011	2	0	8	63	cattle
6/13/2011	7/13/2011	2	70	140	259	cattle
7/5/2011	8/4/2011	2	280	150	260	cattle
8/1/2011	8/31/2011	1	80	80	80	cattle
9/9/2011	10/9/2011	2	485	110	108	cattle
10/7/2011	11/6/2011	2	25	84	259	cattle
10/13/2011	11/12/2011	1	285	285	285	cattle

South Robinson Creek @ Hwy 395 (630RBS008)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
5/31/2011	6/30/2011	2	0	6	36	cattle
6/13/2011	7/13/2011	2	40	72	141	cattle
7/5/2011	8/4/2011	2	130	149	166	cattle
8/1/2011	8/31/2011	1	170	170	170	cattle
9/9/2011	10/9/2011	2	165	122	139	cattle
10/7/2011	11/6/2011	2	90	141	212	cattle
10/13/2011	11/12/2011	1	220	220	220	No

East Walker River at Bridgeport @ Hwy 395 (630EWK006)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
6/13/2011	7/13/2011	3	515	566	655	cattle
7/5/2011	8/4/2011	4	510	483	684	cattle
7/7/2011	8/6/2011	3	690	474	686	cattle
7/14/2011	8/13/2011	2	230	393	385	No
8/1/2011	8/31/2011	3	670	315	286	cattle
8/29/2011	9/28/2011	7	300	170	161	cattle
8/31/2011	9/30/2011	6	155	155	303	cattle
9/8/2011	10/8/2011	6	116	128	130	cattle
9/9/2011	10/9/2011	5	280	131	170	cattle
9/15/2011	10/15/2011	5	325	67	263	No
9/19/2011	10/19/2011	5	170	34	122	cattle
9/27/2011	10/27/2011	4	50	22	50	cattle
10/7/2011	11/6/2011	3	50	17	42	No
10/13/2011	11/12/2011	2	10	10	10	No
10/19/2011	11/18/2011	1	10	10	10	No

East Walker River at CA/NV State Line (630EWK001)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100 ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
1/6/2011	2/5/2011	1	10	10	10	No
3/8/2011	4/7/2011	1	0	0	0	No
4/27/2011	5/27/2011	2	0	2	2.7	No
5/23/2011	6/22/2011	2	3	19	110	No
6/13/2011	7/13/2011	1	122	122	122	No
7/7/2011	8/6/2011	2	25	46	79	No
8/1/2011	8/31/2011	1	85	85	85	No

Upper Buckeye sites

The "Upper Buckeye" sites are located west of the town of Bridgeport, upstream of the Bridgeport Valley, in the Toiyabe National Forest. From the USFS Buckeye campground, it is a one-mile hike to the upper Buckeye Creek site ("above campground"). Livestock graze upon National Forest System lands in the area, as well as upon private inholdings adjacent to Buckeye Creek. The Eagle Creek sampling location is located just off the Eagle Creek trail, about one-half mile from the Buckeye campground. A fire on Buckeye Road at the beginning of September 2011 prevented access to both Upper Buckeye sites.

Buckeye Creek above campground (630BUCB01)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100ml)	30-day log normalized mean (20/100 ml)	Livestock Upstream
8/17/2011	9/16/2011	8	24	24	No
8/23/2011	9/22/2011	8	12	19	No
8/29/2011	9/28/2011	7	45	20	No
8/30/2011	9/29/2011	6	15	18	cattle
8/31/2011	9/30/2011	5	35	18	cattle
9/8/2011	10/8/2011	4	31	15	cattle
9/9/2011	10/9/2011	3	28	12	cattle
9/15/2011	10/15/2011	2	16	8	No
9/21/2011	10/21/2011	1	4	4	No
10/7/2011	11/6/2011	5	21	3	No
10/13/2011	11/12/2011		3		No
10/19/2011	11/15/2011		3		No
10/21/2011	11/20/2011		2		No
10/27/2011	11/26/2011		1		No



Meadow at Buckeye Creek with cows grazing (8/31/2011, CMN)



Uplands near Buckeye Creek with cows grazing (8/31/2011, CMN)

Eagle Creek (630EAGB01)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100ml)	30-day log normalized mean (20/100 ml)	Livestock Upstream
8/31/2011	9/30/2011	5	19	9	No
9/8/2011	10/8/2011	4	5	7	No
9/9/2011	10/9/2011	3	4	8	No
9/15/2011	10/15/2011	2	15	12	No
9/21/2011	10/21/2011	1	9	9	No
10/7/2011	11/6/2011	5	0	1	No
10/13/2011	11/12/2011		3		No
10/19/2011	11/15/2011		0		No
10/21/2011	11/20/2011		1		No
10/27/2011	11/26/2011		0		No

Virginia Creek (below Willow Springs) and Lee Vining Creek (below Camp Azusa)

South of the town of Bridgeport, Virginia Creek flows along Highway 395 through the resort area of Willow Springs. A sampling site was established in 2011 at the USGS gaging station just downstream of Willow Springs. Figure 5 depicts the location of this site.

Camp Azusa is located in Lee Vining Canyon, upstream of the Forest Service ranger station. It is a senior citizens' "summer camp" that has been developed in very close proximity to Lee Vining Creek. A sampling location was established just below the camp. The location of this site is shown in Figure 5.

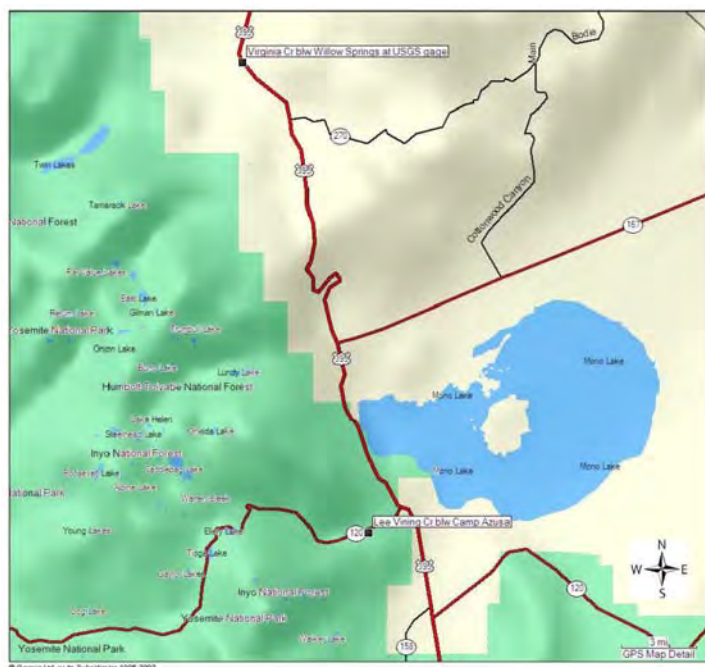


Figure 5. Virginia Creek and Lee Vining Creek sampling sites

Virginia Creek below Willow Springs (at USGS gage) (630VIR004)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100ml)	30-day log normalized mean (20/100 ml)
7/27/2011	8/26/2011	2	12	13
8/23/2011	9/22/2011	3	15	6
8/30/2011	9/29/2011	2	14	4
9/19/2011	10/19/2011	1	1	1
11/17/2011	12/17/2011	1	1	1

Lee Vining Creek (below Camp Azusa) (601LVCB01)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100ml)	30-day log normalized mean (20/100 ml)
8/16/2011	9/15/2011	2	6	2
9/13/2011	10/13/2011	2	0	0
9/19/2011	10/19/2011	1	0	0
11/17/2011	12/17/2011	2	0	0
12/7/2011	1/6/2012	2	0	0
12/12/2011	1/11/2012	1	0	0

Mammoth Creek sites

Four sites were sampled along Mammoth Creek (Figure 6). “Mammoth Creek above Horsecamp” is located within the town of Mammoth Lakes at the Mammoth Creek Park. “Mammoth Creek at Horsecamp” receives runoff from a stable operation. “Mammoth Creek at Hwy 395” is located southeast of the town of Mammoth Lakes, at Hwy 395. Although no cattle were noted this field season at the Hwy 395 site, livestock grazing has been evident in the past. “Mammoth Creek above Hot Creek” is located downstream of the Hot Creek Fish Hatchery. The area just upstream of this latter site is often grazed by cattle during the summer months.

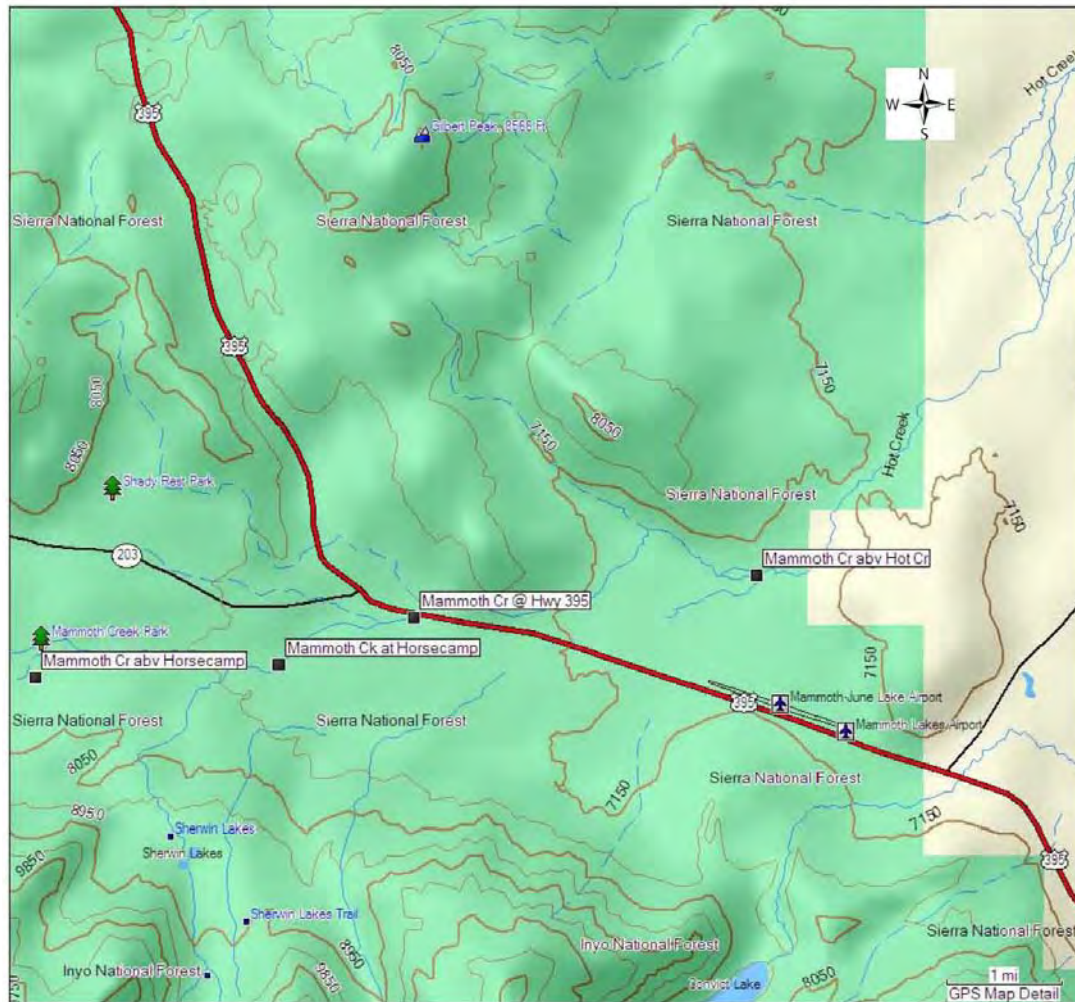


Figure 6. Mammoth Creek sampling sites

Mammoth Creek above Horsecamp (603MAM014)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies /100ml)	30-day log normalized mean (20/100 ml)
1/24/2011	2/23/2011	1	0	1
3/10/2011	4/9/2011	1	0	1
4/28/2011	5/28/2011	2	0	1
5/25/2011	6/24/2011	2	0	2
6/15/2011	7/15/2011	2	4	2
7/14/2011	8/13/2011	1	0	1
8/16/2011	9/15/2011	1	11	11
9/27/2011	10/27/2011	1	10	10

Mammoth Creek at Horsecamp (603MAM003)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies /100ml)	30-day log normalized mean (20/100 ml)	Livestock Upstream
1/24/2011	2/23/2011	1	0	1	No
3/10/2011	4/9/2011	1	0	1	No
4/28/2011	5/28/2011	2	0	3	No
5/25/2011	6/24/2011	2	10	4	No
6/15/2011	7/15/2011	2	2	1	horses
7/14/2011	8/13/2011	1	0	1	horses
8/16/2011	9/15/2011	1	12	12	horses
9/27/2011	10/27/2011	1	2	2	horses

Mammoth Creek at HWY 395 (603MAM006)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies /100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
1/24/2011	2/23/2011	1	3	3	3	No
3/10/2011	4/9/2011	1	0	0	0	No
4/28/2011	5/28/2011	2	0	2	4	No
5/25/2011	6/24/2011	2	4	11	26	No
6/15/2011	7/15/2011	2	28	12	26	No
7/14/2011	8/13/2011	1	5	5	5	No
8/16/2011	9/15/2011	1	112	112	112	No
9/27/2011	10/27/2011	1	8	8	8	No

Mammoth Creek above Hot Creek (603MAM013)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies /100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
1/24/2011	2/23/2011	1	0	0	0	No
3/10/2011	4/9/2011	1	0	0	0	No
6/15/2011	7/15/2011	2	386	150	353	No
7/14/2011	8/13/2011	1	58	58	58	cattle
8/16/2011	9/15/2011	1	150	150	150	cattle
9/27/2011	10/27/2011	1	12	12	12	No

Crooked Creek sites (Inyo National Forest)

Crooked Creek lies east of Bishop, CA, high in the arid White Mountains. Livestock are grazed on National Forest System lands at high elevations (up to 10,000 feet), where little forage is available except along the stream margins. Livestock therefore tend to congregate near the stream channel, and were observed standing in and near the creek. Only one visit was made to this area (on 8/15/11), during which a total of five samples were collected from three sites. Two of the five samples were collected downstream of active cattle grazing areas. The two samples collected downstream of grazed areas showed fecal coliform concentrations of 300 and 316. Three of the five samples were collected upstream of active cattle grazing areas, at sites where no grazing had yet occurred during 2011. Those three “upstream” samples showed almost no fecal coliform bacteria (0-1 colony/100ml). Refer to Figure 7 for locations.



Figure 7. Crooked Creek sampling sites

Crooked Creek Sampling Sites (all samples collected August 15, 2011)

Site Description	Site Code	# of samples in 30-day period	fecal coliform (colonies /100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
Crooked Creek, 1 mi below Deep Springs Cow Camp	605CRKB01	2	300	308	314	cattle
		1	316	316	316	cattle
Crooked Creek just below Deep Springs Cow Camp	605CRKB02	2	0	1	1	No
		1	1	1	1	No
Crooked Creek above Deep Springs Cow Camp	605CRKB03	1	0	0	0	No



Cattle congregating near Crooked Creek, approx. 9,000 feet elevation (8/15/11, TJS)



Ungrazed section of Crooked Creek (8/15/11, TJS)

Golden Trout Camp (Inyo National Forest)

The [Golden Trout Camp](#) (GTC) is a non-profit educational facility located within the Golden Trout Wilderness (Inyo National Forest). Access to the camp is via a 2-mile hike (each way) from the Horseshoe Meadow Road. Facilities at the camp include several log cabins, a pit toilet, and a corral used to confine several burros (which are used to transport supplies to the camp and to support its wilderness education outings).

Two site visits were made in 2011. Creeks in the vicinity and downstream of the GTC were sampled twice during July 2011, when the camp was in full operation for the summer season. The results are presented in the table below. Bacteria levels were low (<20/100mL) in all samples. Given the logistical constraints of meeting analytical holding times for the samples (i.e., approx. 1-hr hike each way), the small size of the

camp, the very small number of stock animals, and the low bacteria concentrations detected during two sampling events, monitoring at this site was discontinued.

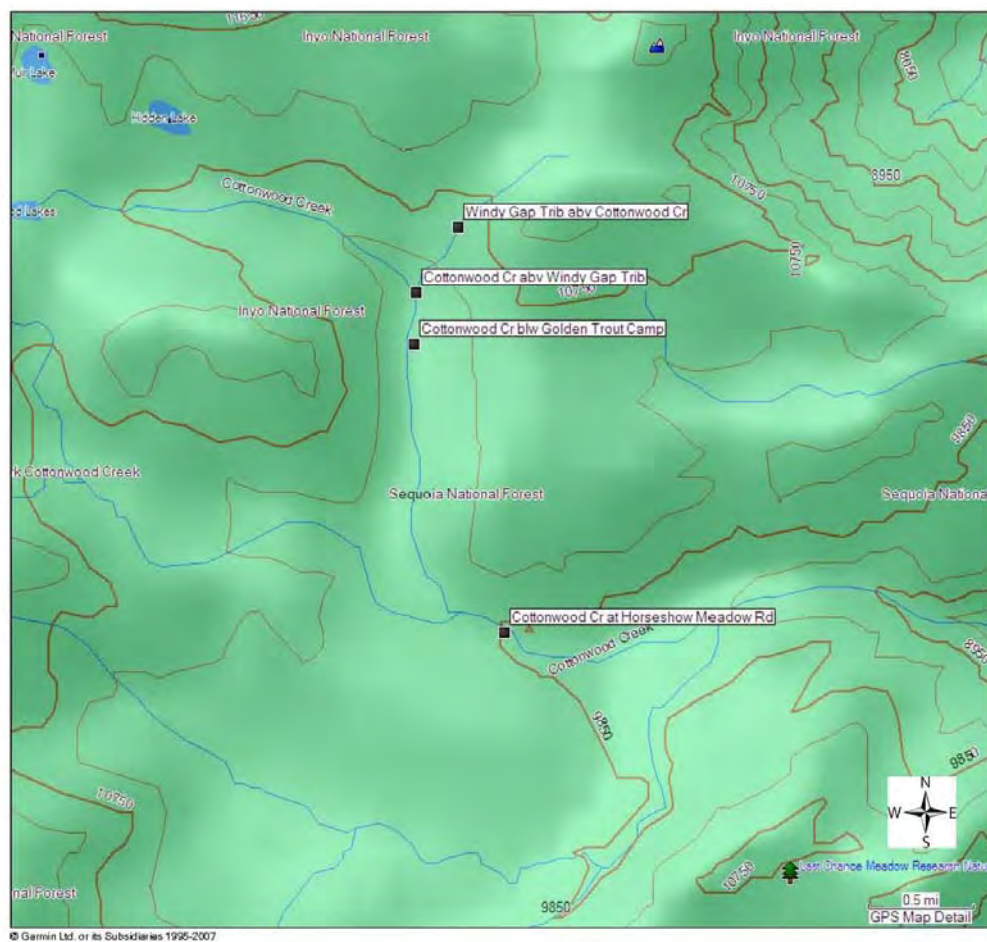


Figure 8. Golden Trout Camp sampling sites

Sites in vicinity of Golden Trout Camp	Date	fecal coliform (colonies per 100ml)
Cottonwood Cr above Windy Gap tributary (603CTNB03)	7/10/2011	2
	7/13/2011	0
Windy Gap trib above confluence with Cottonwood Cr (603WGTB01)	7/10/2011	4
	7/13/2011	1
Cottonwood Cr below GTC, below camp fence/gate (603CTNB02)	7/10/2011	17
	7/13/2011	2
Cottonwood Cr @ Horseshoe Meadow Road (603CTNB01)	7/10/2011	4
	7/13/2011	2

Horseshoe Meadow Sites (Inyo National Forest)

The [Horseshoe Meadow](#) sites are located west of Lone Pine, CA in the Inyo National Forest. A total of four sites were sampled (Figure 9), including three grazed sites and one ungrazed control site. The three rangeland sites (all within the “Mulkey Allotment” in the Golden Trout Wilderness) are: 1) Horseshoe Meadow Creek just above the Trail Pass trail crossing, 2) Horseshoe Meadow Creek just above its confluence with Round Valley Creek, and 3) Round Valley Creek just above its confluence with Horseshoe Meadow Creek. A nearby control site was established at Little Cottonwood Creek (just above the point where the creek crosses under Horseshoe Meadow Road). Little Cottonwood Creek is considered a control site because there is no known livestock grazing in its watershed, and no other known bacterial discharges other than wildlife and very light dispersed recreational (i.e., hiking) uses.

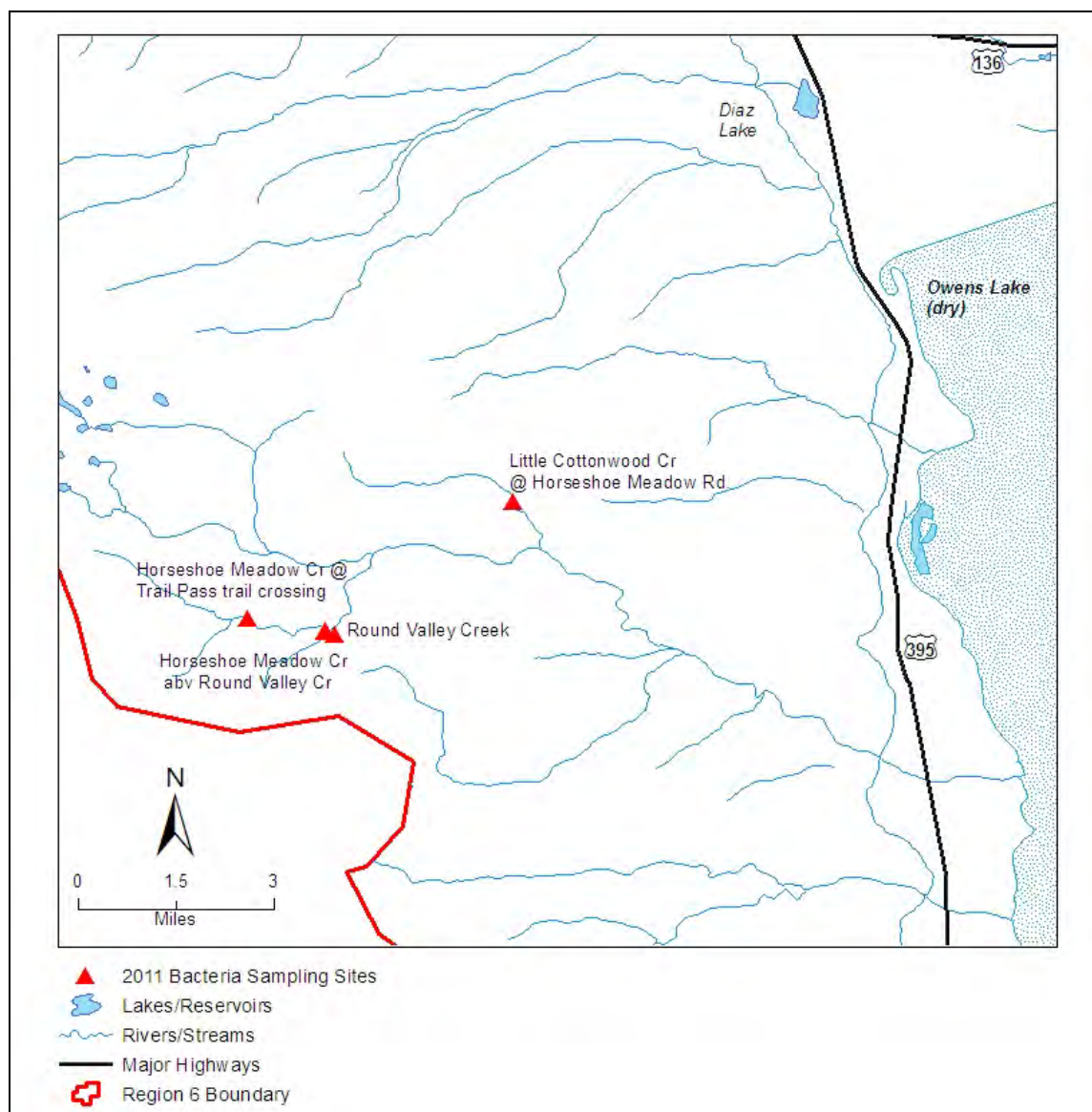


Figure 9. Map of Horseshoe Meadow sampling site

Horseshoe Meadow Creek above Trail Pass trail crossing (603HMCB02)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
7/10/2011	8/9/2011	3	2	2	3	No
7/13/2011	8/13/2011	3	1	3	12	No
7/27/2011	8/26/2011	2	3	6	13	No
8/10/2011	9/9/2011	2	14	18	21	cattle
9/9/2011	9/30/2011	5	22	33	46	cattle
9/12/2011	10/12/2011	4	50	37	47	No
9/13/2011	10/13/2011	3	32	33	38	No
9/19/2011	10/19/2011	2	30	34	38	No
9/20/2011	10/20/2011	1	39	39	39	cattle
10/4/2011	10/25/2011	4	8	7	8	No
10/22/2011			4			No
10/24/2011			8			No
10/25/2011			8			No



Horseshoe Meadow at Trail Pass sampling location (7/13/11, KH)



Meadow at the Horseshoe Meadow at Trail Pass sampling location (8/23/11)

Horseshoe Meadow Creek above Round Valley Creek (603HMCB01)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies per 100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
7/10/2011	8/9/2011	3	0	1	2	No
7/13/2011	8/13/2011	3	0	2	2	No
7/27/2011	8/26/2011	2	2	2	2	No
8/10/2011	9/9/2011	2	2	5	13	No
9/9/2011	9/30/2011	5	14	23	40	cattle
9/12/2011	10/12/2011	4	23	26	41	No
9/13/2011	10/13/2011	3	43	27	41	No
9/19/2011	10/19/2011	2	13	21	33	No
9/20/2011	10/20/2011	1	35	35	35	cattle
10/4/2011	10/25/2011	4	2	5	16	No
10/22/2011			5			No
10/24/2011			21			No
10/25/2011			4			No



Horseshoe Meadow Creek at Round Valley Creek confluence (7/13/11)



Looking upstream at Horseshoe Meadow Creek (7/13/11)

Round Valley Creek above Horseshoe Meadow Creek (603RVCB01)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100ml)	30-day log normalized mean (20/100 ml)	90th percentile (40/100 ml)	Livestock Upstream
7/10/2011	8/9/2011	3	3	1	3	No
7/13/2011	8/13/2011	3	1	1	2	No
7/27/2011	8/26/2011	2	1	1	2	No
8/10/2011	9/9/2011	2	2	27	337	No
9/9/2011	9/30/2011	5	374	47	244	cattle
9/12/2011	10/12/2011	4	50	28	50	No
9/13/2011	10/13/2011	3	24	23	45	No
9/19/2011	10/19/2011	2	50	22	46	No
9/20/2011	10/20/2011	1	10	10	10	cattle
10/4/2011	10/25/2011	4	4	5	11	No
10/22/2011			12			No
10/24/2011			9			No
10/25/2011			2			No



Round Valley Creek (7/13/11)



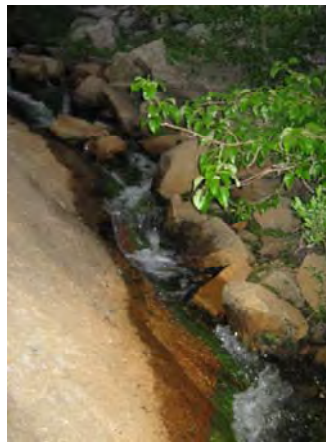
Round Valley Creek (7/13/11)

Little Cottonwood Creek (603LCCB01) (control site)

DATE	to date (30 days)	# of samples in 30-day period	fecal coliform (colonies/100ml)	30-day log normalized mean (20/100 ml)
7/14/2011	8/13/2011	3	1	1
7/27/2011	8/26/2011	2	0	1
8/10/2011	9/9/2011	2	2	1
9/9/2011	9/30/2011	5	0	1
9/12/2011	10/12/2011	4	2	1
9/13/2011	10/13/2011	3	1	1
9/19/2011	10/19/2011	2	2	1
9/20/2011	10/20/2011	1	1	1
10/4/2011	10/25/2011	4	2	1
10/22/2011			1	
10/24/2011			2	
10/25/2011			1	



Culvert below sampling site at Little Cottonwood Creek (7/13/11)



Cement reinforcement before going through culvert on Little Cottonwood Creek (7/13/11)

DISCUSSION

This report presents bacteria sampling results for 2011. It is not intended to be a stand-alone comprehensive assessment. For example, the results reported here for the Bridgeport area should be combined with data collected by other entities to provide a more comprehensive assessment for that area. All of these data should be combined with all other readily available data as part of the State's comprehensive "[Integrated Report](#)" assessments.

Of the sites sampled in this study, high concentrations of fecal coliform bacteria (e.g., 50 to 300+ colonies/100ml) were most commonly detected downstream of rangeland

grazing operations where cattle have uncontrolled access to surface waters. Low concentrations of bacteria were found at recreation camps and rural resort/housing areas.

It should be noted that the spring and summer of 2011 experienced a remarkably heavy and late-melting snowpack. We observed that forage in the high Sierra stayed green much later than normal (well into August and even September), even in many upland areas away from creek channels. This created favorable conditions for livestock distribution. Sampling during more normal (or lower) snowpack conditions could inform whether bacteria concentrations differ when livestock distribution conditions are not as favorable.

The results of this study will be assessed further by our Region's various programs (Nonpoint Source, TMDLs, planning, enforcement, etc.) for follow-up action(s) as appropriate. Sampling may continue at these (or other sites in the Region) in future years as staff time and funding allow.

ACKNOWLEDGEMENTS

The authors would like to thank Marvin Moskowitz and staff at the Inyo County Health Services laboratory for processing samples, Kris Kuyper and staff at the Sierra Business Council for administrative support, staff at the U.C. Crooked Creek Research Station for providing information about road conditions in the White Mountains, staff at the Golden Trout Camp for providing a site tour and information about nearby creeks, and numerous Water Board student assistants who helped with field collections, laboratory analyses, data management, and quality assurance tasks. We especially thank (in alphabetical order): Allison Bratton, Bruce McIntosh, Raina Patrocinio, Kelsey Smith, Patrick Smith, and Angie Sturm for their cheerful assistance.

REFERENCES

American Public Health Association, American Water Works Association, Water Environment Federation. 2006. *Standard Methods for the Examination of Water and Wastewater*, [online edition](#).

Lahontan Regional Water Quality Control Board. 2011. *Quality Assurance Project Plan for Lahontan Region Bacteria Monitoring*, Version 1.0, Summer 2011. California Regional Water Quality Control Board, Lahontan Region, South Lake Tahoe, CA.

Surface Water Ambient Monitoring Program. 2008. [Quality Assurance Program Plan, Version 1.0](#). State Water Resources Control Board, Sacramento, CA. September 1, 2008. 190 pp.

APPENDIX A – Site List (from north to south), page 1 of 2

Site name	site code	latitude	longitude	Primary Land Use in 2011				
				C & R	REC	RNG	MXD	CTL
West Fork Carson River @ Paynesville bridge	633WFCB02	38.80889	-119.77714				X	
East Fork Carson River, at USGS gage blw Markleeville	632ECR005	38.71542	-119.76440				X	
West Walker River at Topaz	631WWK008	38.61051	-119.51758				X	
West Walker River, nr Coleville	631WWK001	38.51337	-119.44880				X	
West Walker River above confluence with Little Walker River	631WWK007	38.37927	119.45112				X	
West Walker River above Pack Station	631WWK010	38.32316	-119.54865				X	
East Walker River, at CA/NV state line	630EWK001	38.41399	-119.16574				X	
Hot Creek above confluence with Little Walker River	631HOT001	38.34206	-119.45074				X	
Little Walker River above confluence with Hot Creek	631LWK004	38.34170	-119.45089				X	
Sardine Creek above McKay Creek	631SDCB02	38.31423	-119.60825			X		
Sardine Creek below McKay Creek	631SDCB01	38.31231	-119.60114			X		
Swauger Creek, above Huntoon Valley	630SWA006	38.34283	-119.32310				X	
Swauger Creek, below Huntoon Valley	630SWA005	38.29586	-119.30966			X		
No. Branch Buckeye Creek, upstream bridge	630BUC004	38.26372	-119.27733			X		
Mid Branch Buckeye Creek, upstream bridge	630BUC005	38.26216	-119.27584			X		
No. Branch Robinson Creek, upstream bridge	630RBS007	38.25973	-119.27348			X		
So. Branch Robinson Creek, upstream bridge	630RBS008	38.25845	-119.27229			X		
East Walker River at HWY 395, Bridgeport	630EWK006	38.25533	-119.22380				X	
Buckeye Creek above campground	630BUCB01	38.23400	-119.37282			X		
Eagle Creek (lower reach)	630EAGB01	38.23178	-119.34756			X		
Virginia Creek, below Willow Springs (at USGS gage)	630VIR004	38.11310	-119.12330	X				
Lee Vining Creek below Camp Azusa	601LVCB01	37.93598	-119.13721		X			

Legend (all coordinates in decimal degrees, NAD 83)

C&R = commercial and/or residential development

REC = recreation camp

RNG = rangeland / agriculture

MXD = mixed land uses

CTL = control

APPENDIX A – Site List (continued), page 2 of 2

Site name	site code	latitude	longitude	Primary Land Use in 2011				
				C & R	REC	RNG	MXD	CTL
Mammoth Creek above Horsecamp	603MAM014	37.63480	-118.96759	X				
Mammoth Creek Horsecamp	603MAM003	37.63394	-118.95952				X	
Mammoth Creek, at HWY 395	603MAM006	37.63799	-118.90771				X	
Mammoth above confluence with Hot Cr (near Hot Cr Hatchery)	603MAM013	37.64336	-118.85336				X	
Crooked Creek 1 mi below Deep Springs Cow Camp	603CRKB01	37.48449	-118.09371			X		
Crooked Creek just below Deep Springs Cow Camp	603CRKB02	37.49691	-118.10435					X
Crooked Creek above Deep Springs Cow Camp	603CRKB03	37.49528	-118.12099					X
Cottonwood Creek above confluence with Windy Gap Tributary	603CTNB03	36.48408	-118.17706					X
Windy Gap Tributary above confluence with Cottonwood Creek	603WGTB01	36.48425	-118.17689					X
Cottonwood Creek below Golden Trout Camp	603CTNB02	36.48056	-118.17728		X			
Cottonwood Creek at Horseshoe Meadow Rd	603CTNB01	36.45951	-118.16387				X	
Horseshoe Meadow Creek at Trail Pass trail crossing	603HMCB02	36.44745	-118.17867			X		
Horseshoe Meadow Creek above confluence with Round Valley Creek	603HMCB01	36.44503	-118.16156			X		
Round Valley Creek above confluence with Horseshoe Meadow Creek	603RVCB01	36.44464	-118.16135			X		
Little Cottonwood Creek at Horseshoe Meadow Rd	603LCCB01	36.47356	-118.12001					X

Legend (all coordinates in decimal degrees, NAD 83)

C&R = commercial and/or residential development

REC = recreation camp

RNG = rangeland / agriculture

MXD = mixed land uses

CTL = control

ENCLOSURE 4

This page is intentionally left blank.



2012 Recreational Water Quality Criteria

Summary

EPA has released its 2012 recreational water quality criteria (RWQC) recommendations for protecting human health in all coastal and non-coastal waters designated for primary contact recreation use. EPA provides two sets of recommended criteria. Primary contact recreation is protected if either set of criteria recommendations are adopted into state water quality standards.

These recommendations are intended as guidance to states, territories and authorized tribes in developing water quality standards to protect swimmers from exposure to water that contains organisms that indicate the presence of fecal contamination.

Background

EPA last issued ambient water quality criteria recommendations for recreational waters in 1986. EPA issues such recommendations under the authority of the Clean Water Act (CWA). Amendments to the CWA by the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000 direct EPA to conduct studies associated with pathogens and human health, and to publish new or revised criteria recommendations for pathogens and pathogen indicators based on those studies. These 2012 RWQC meet those requirements.

The 2012 RWQC rely on the latest research and science, including studies that show a link between illness and fecal contamination in recreational waters. They are based on the use of two bacterial indicators of fecal contamination, *E. coli* and enterococci. The new criteria are designed to protect primary contact recreation, including swimming, bathing, surfing, water skiing, tubing, water play by children, and similar water contact activities where a high degree of bodily contact with the water, immersion and ingestion are likely.

What are the recommendations?

The 2012 RWQC offer two sets of numeric concentration thresholds, either of which would protect the designated use of primary contact recreation and, therefore, would protect the public from exposure to harmful levels of pathogens. Illness rates upon which these recommendations are based use the National Epidemiological and Environmental Assessment of Recreational Water (NEEAR) definition of gastrointestinal illness, which is not limited to illnesses which exhibit a fever.

The RWQC consist of three components: magnitude, duration and frequency. The magnitude of the bacterial indicators are described by both a geometric mean (GM) and a statistical threshold value (STV) for the bacteria samples. The STV approximates the 90th percentile of the water quality distribution and is intended to be a value that should not be exceeded by more than 10 percent of the samples taken. The table summarizes the magnitude component of the recommendations. All three components are explained in more detail in the sections below.

CRITERIA ELEMENTS	Recommendation 1 Estimated Illness Rate 36/1,000		Recommendation 2 Estimated Illness Rate 32/1,000	
	GM (cfu/100 mL)	STV (cfu/100 mL)	GM (cfu/100 mL)	STV (cfu/100 mL)
Enterococci (marine & fresh)	35	130	30	110
<i>E. coli</i> (fresh)	126	410	100	320

Water quality criteria recommendations are intended as guidance in establishing new or revised water quality standards. They are not regulations themselves. States and authorized tribes have the discretion to adopt, where appropriate, other scientifically defensible water quality criteria that differ from EPA's recommended criteria.

RECOMMENDATION 1: MAGNITUDE

Enterococci: Culturable enterococci at a

geometric mean (GM) of 35 colony forming units (CFU per 100 milliliters (mL) and a statistical threshold value (STV) of 130 cfu per 100 mL, measured using *EPA Method 1600*, or any other equivalent method that measures culturable enterococci.

E. coli: Culturable *E. coli* at a GM of 126 cfu per 100 mL and an STV of 410 cfu per 100 mL measured using *EPA Method 1603*, or any other equivalent method that measures culturable *E. coli*.

RECOMMENDATION 2: MAGNITUDE

Enterococci: Culturable enterococci at a GM of 30 cfu per 100 mL and an STV of 110 cfu per 100 mL, measured using *EPA Method 1600*, or any other equivalent method that measures culturable enterococci.

E. coli: Culturable *E. coli* at a GM of 100 cfu per 100 mL and an STV of 320 cfu per 100 mL measured using *EPA Method 1603*, or any other equivalent method that measures culturable *E. coli*.

FOR BOTH RECOMMENDATIONS

Duration and Frequency: The waterbody GM should not be greater than the selected GM magnitude in any 30-day interval. There should not be greater than a ten percent excursion frequency of the selected STV magnitude in the same 30-day interval.

How are these criteria different from the 1986 criteria?

Similar Protection for Fresh and Marine Waters: The EPA used an analysis of NEEAR water quality data to refine the illness rate estimate for the recommended marine criterion for enterococci. The 2012 RWQC values now protect public health similarly in both marine and fresh waters.

A New Measurement Value: EPA is introducing a new term, Statistical Threshold Value (STV), to be used in conjunction with the recommended GM value.

New Early Alert Tool: In addition to recommending criteria values, EPA is now also

providing states with Beach Action Values (BAVs) for use in notification programs. The BAV is provided for states to use as a precautionary tool to provide an early alert to beachgoers, including families with children.

A Single Level of Beach Use: The 1986 bacteria criteria document included four single sample maximum (SSM) values appropriate for different levels of beach usage (use intensities). In the 2012 RWQC, EPA removed those recommendations and instead provided states with optional, precautionary BAVs for use in monitoring and notification programs.

More Tools for Assessing and Managing Recreational Waters: EPA is providing information on tools for evaluating and managing recreational waters, such as predictive modeling and sanitary surveys. The Agency is also providing tools for developing site-specific criteria such as epidemiological studies, quantitative microbial risk assessment, and use of alternative indicators or methods. The EPA has developed and validated a molecular testing method using quantitative polymerase chain reaction (qPCR) as a rapid analytical technique for the detection of enterococci in recreational water (EPA Method 1611). For the purposes of beach monitoring, a state may use a qPCR method on a site-specific basis.

Where can I find more information?

EPA has put the 2012 RWQC document, support documents, and the Federal Register Notice, in the docket (Docket identification No. EPA-HQ-OW-2011-0466) which can be accessed via EPA's website at <http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/index.cfm>.

You can also contact Sharon Nappier at nappier.sharon@epa.gov or (202)566-0740, or contact Tracy Bone at bone.tracy@epa.gov or (202) 564-5257 for more information.

ENCLOSURE 5

This page is intentionally left blank.

Agenda Item #6

Status Report on Bacteria Sampling and Analysis

November 12, 2014

Richard Booth
Chief, TMDL & Basin Planning Unit



11/12/14

Agenda Item #6

1

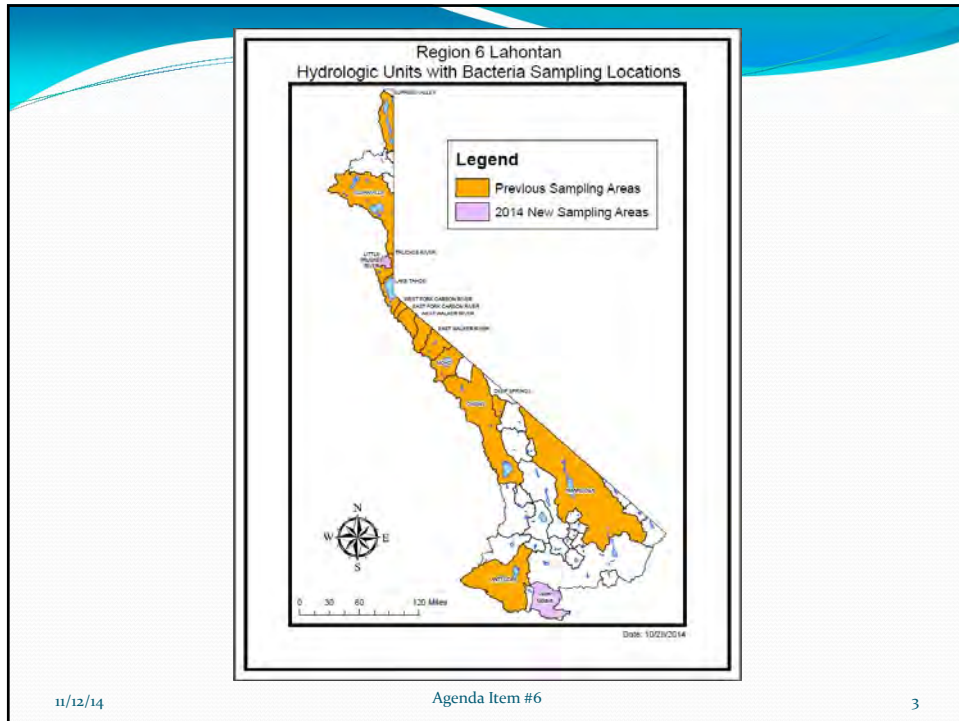
Outline

- **Background**
What is the history of the current bacteria water quality objectives?
- **Bacteria Water Quality Objective (WQO) Project**
What is it?
Why do we need it?
- **Bacteria WQO Project**
What are the steps?
- **State Board's Bacteria Effort**
What is State Board doing about bacteria standards and how are we coordinating?
- **Current data evaluation**
We have data (and are gathering more). Dr. Warden will present a summary of bacteria data.
- **Natural High Quality Waters**
Intentional consumption or relax the current bacteria WQOs?
- **A Preliminary Evaluation of our Waterbodies**

11/12/14

Agenda Item #6

2



- ## Revision of Bacteria Water Quality Objectives
- Define the need
 - Reasons to revise
 - Alternatives
 - Approach
 - How are we implementing the approach
 - Monitor the effects of the revision
 - Verify the revision works
- 11/12/14
- Agenda Item #6
- 4

Revision of Bacteria Water Quality Objectives

- What is the revision of Bacteria Water Quality Objectives?
- Why is it a priority?



11/12/14

Agenda Item #6

5

Revision of Bacteria Water Quality Objectives

- What is the concern?
- What are we doing about it?



Photo : Looking upstream from "Horseshoe Meadow Creek above Trail Pass trail crossing" (603HMCB02) on 6/19/2012

11/12/14

Agenda Item #6

6

State Board's Bacteria Effort

- State Board staff is proposing statewide bacteria objectives
- USEPA 2012 Recreational Water Quality Criteria
- REC-1 Beneficial Use for water contact recreation (e.g., swimming)
- Incidental ingestion of water

11/12/14

Agenda Item #6

7

Natural, High Quality Waters

- Lahontan in a vertical region
- Consumption of untreated or partially treated surface water.



Image from destination90.com

11/12/14



Image from heliostravel.com

Agenda Item #6

8

Compilation of Bacteria Data through 2013

Presentation by Dr. Bruce Warden, followed by
“Next Steps” and
Preliminary Evaluation of our Waterbodies



Photo : Cattle grazing downstream of "Brockman Slough at Center Road" (637BRKB02)
on 6/26/2012

Agenda Item #6

11/12/14

9

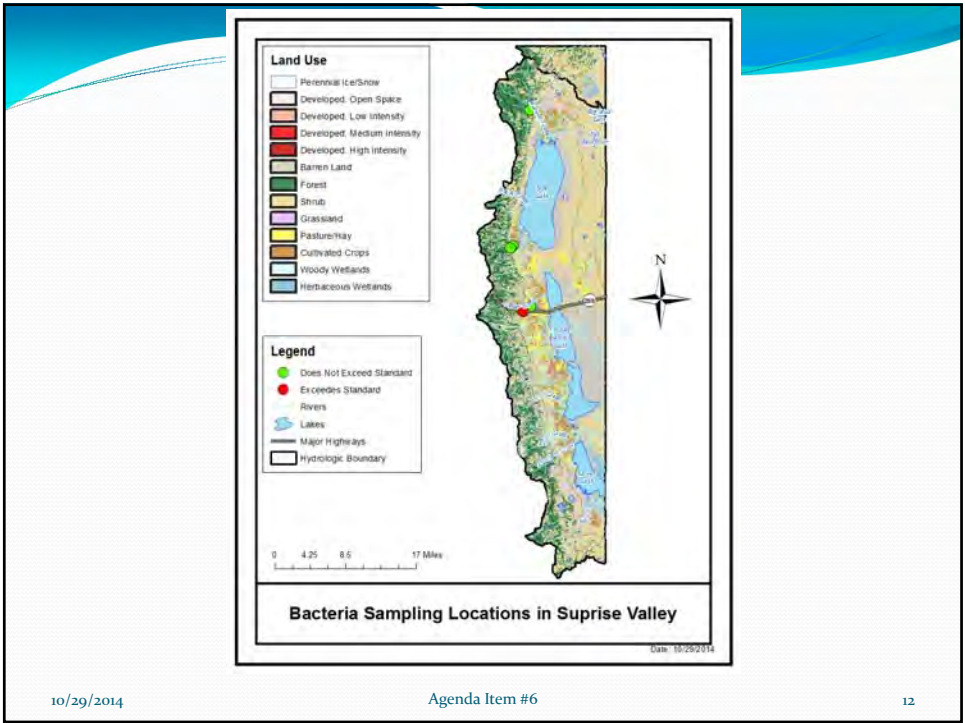
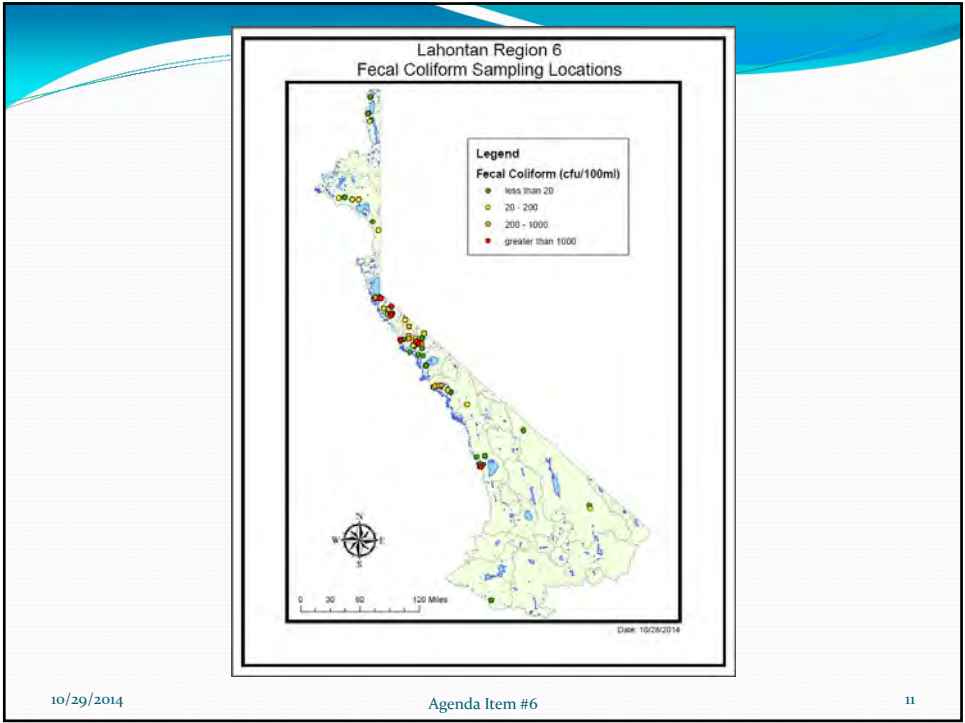
Preliminary Evaluation of our Waterbodies

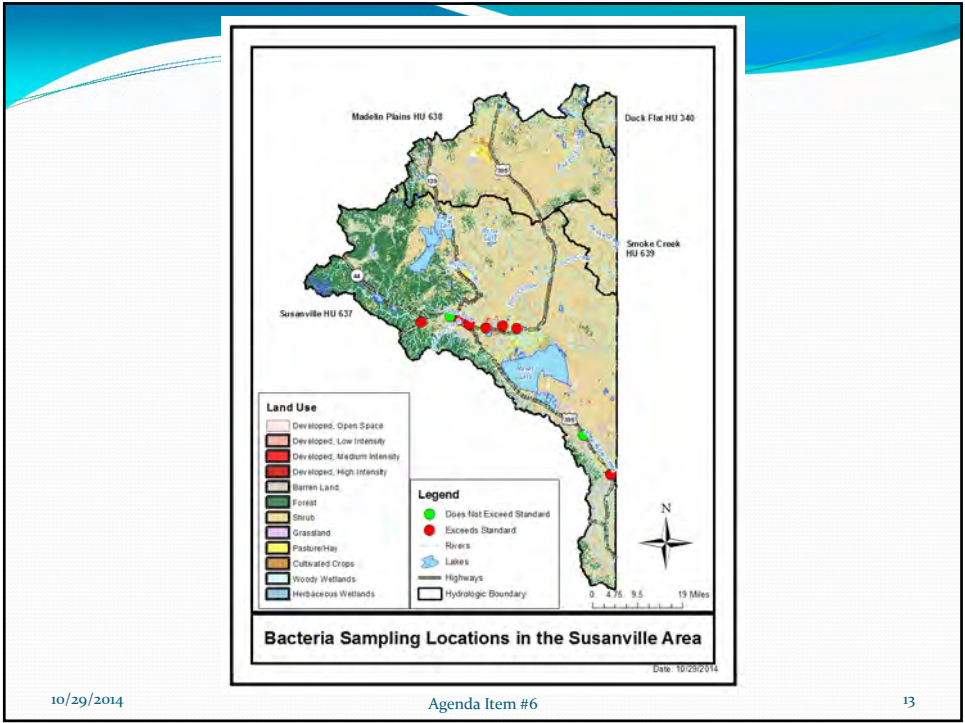
- a) Approximately 64 of the 132 sampling locations in our region meet the existing 20 fecal coliform per 100 mL standard
- b) Approximately 68 of the 132 locations do not meet the 20 fecal coliform per 100 mL standard
- c) Approximately 24 waterbodies in our region have not been evaluated (and will likely not be evaluated)

11/12/14

Agenda Item #6

10

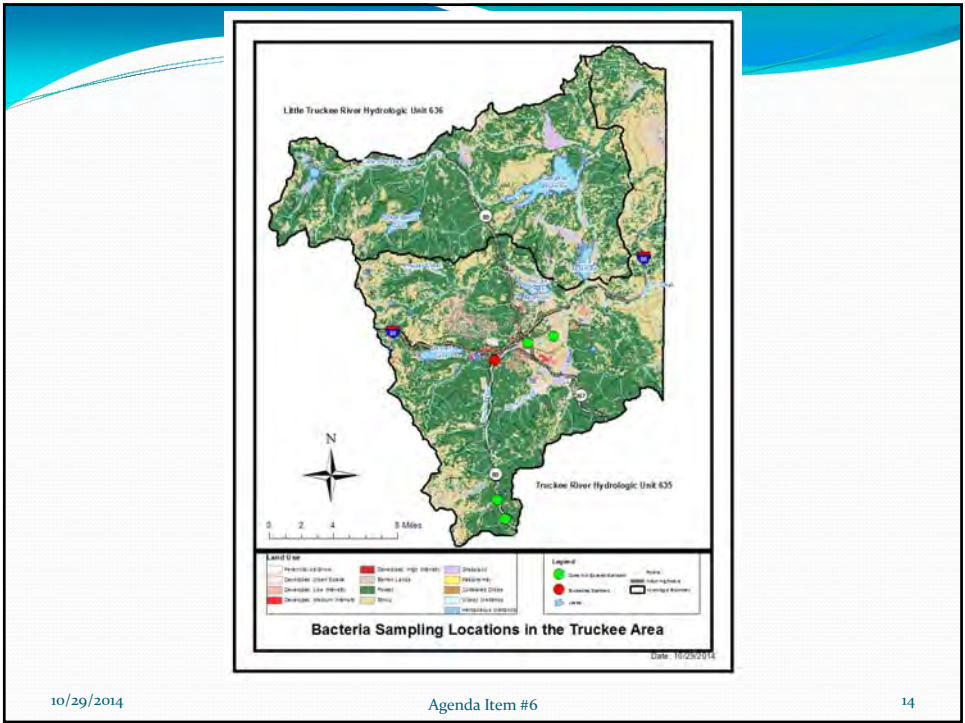




10/29/2014

Agenda Item #6

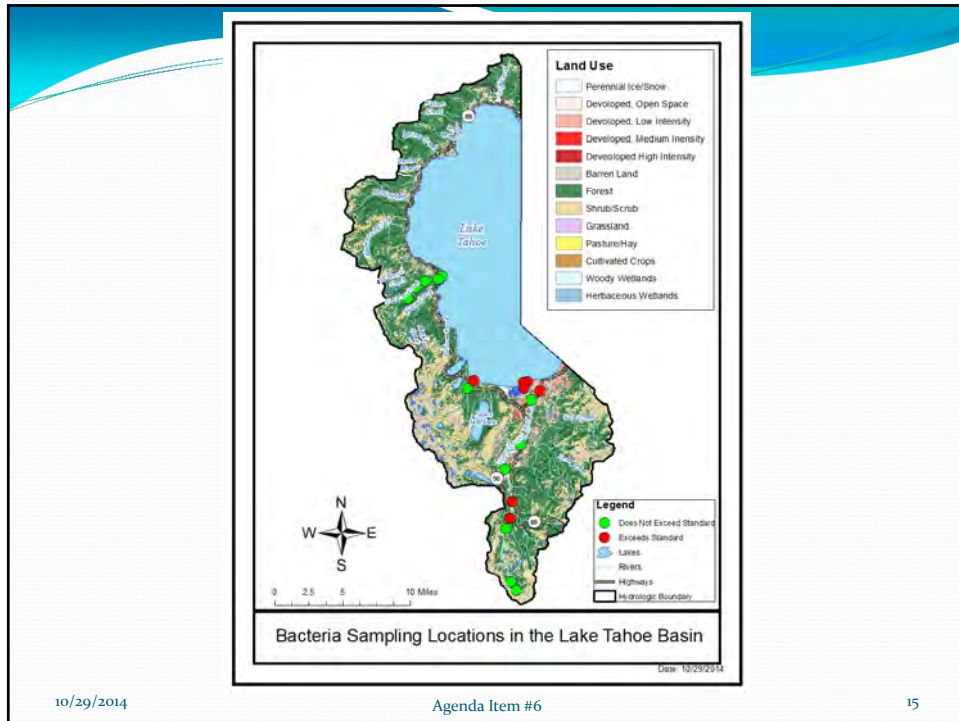
13



10/29/2014

Agenda Item #6

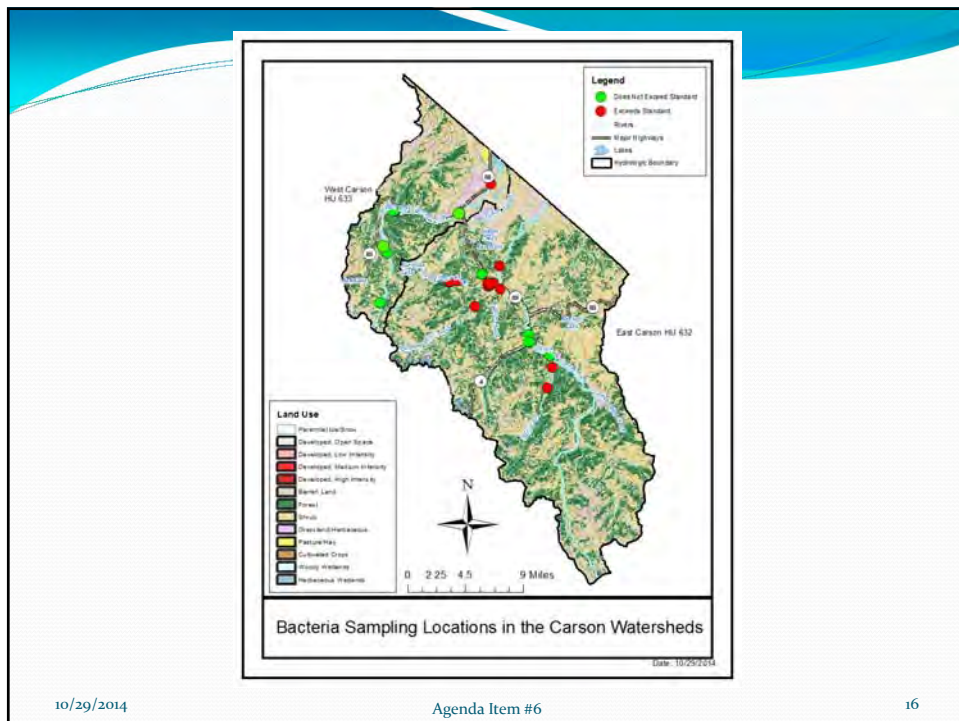
14



10/29/2014

Agenda Item #6

15



10/29/2014

Agenda Item #6

16

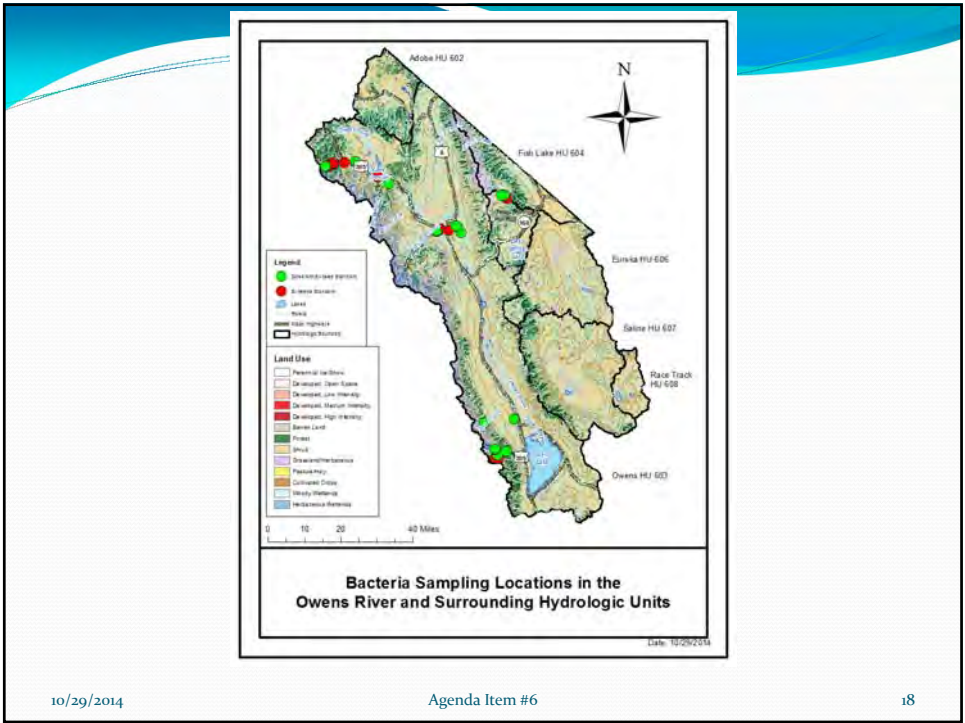
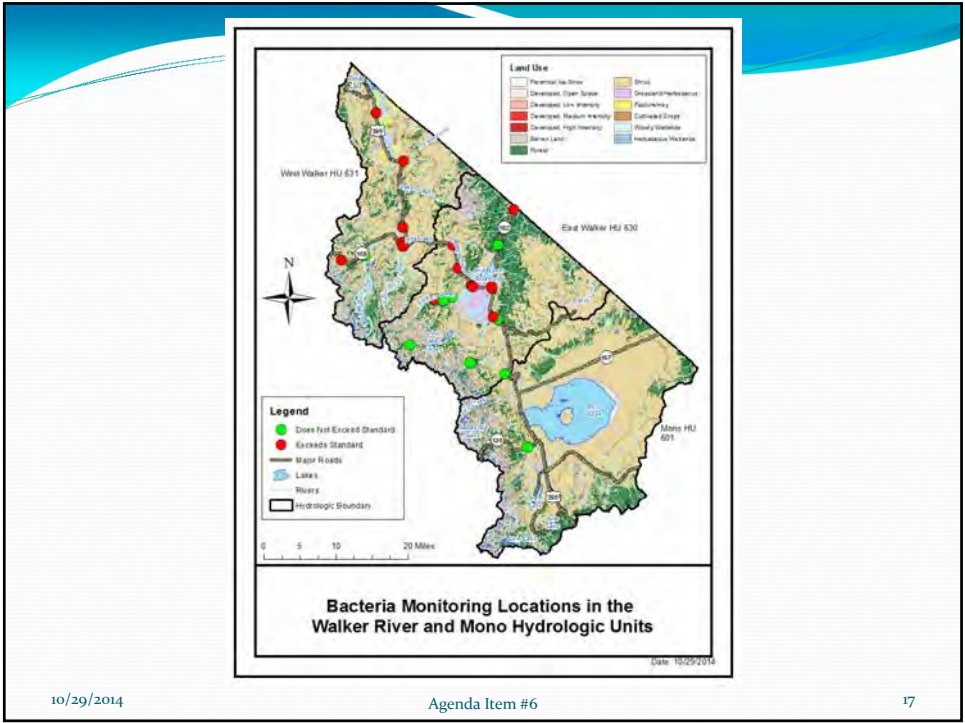
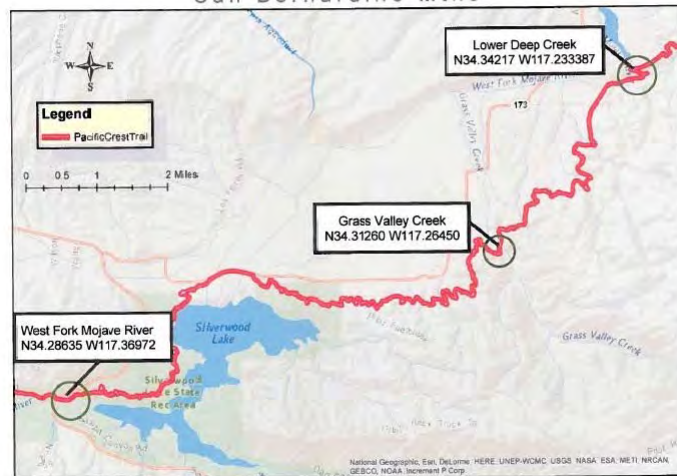


FIGURE 1
Bacteria Sample Locations
San Bernardino Mtns



10/29/2014

Agenda Item #6

19

2 Questions

1. Are there some areas of our region that should be designated specifically for intentional consumption of un-treated or partially treated surface water where the existing 20 fecal coliform per 100 mL standard should be protected?
2. Are there certain areas in our region where the existing 20 fecal coliform per 100 mL standard (or its equivalent in E. coli concentration) should be relaxed?

11/12/14

Agenda Item #6

20

Next Steps

Continue data collection and evaluation

(including metadata [field observations] & Microbial Source Tracking analyses)

Proposed Bacteria WQO Project Final Steps:

1. Establish Beneficial Use for intentional consumption
2. Establish bacteria WQO for areas that cannot achieve 20 FC/100 mL
3. Demarcate the appropriate Beneficial Uses and bacteria WQOs for the waterbody segments, waterbodies, or Hydrologic Units

11/12/14

Agenda Item #6

21

Proposed Schedule

- Begin in 2015 - host public listening sessions
- By the end of 2015 field season - complete data collection
- Spring 2016 - complete data evaluation
- During 2016 - perform Basin Planning Amendment process
- Late 2016/early 2017 - present to Board for adoption

11/12/14

Agenda Item #6

22

This page is intentionally left blank.

ENCLOSURE 6

This page is intentionally left blank.

Agenda Item No. 6

Status Report on Bacteria Sampling and Data Analysis

Bruce T. Warden, Ph.D.
Environmental Scientist



Presentation Overview

- Indicator bacteria monitoring efforts
- Why use indicator bacteria?
- Fecal coliform data analysis
- Elevation and anthropogenic source intensity trends
- Preliminary conclusions

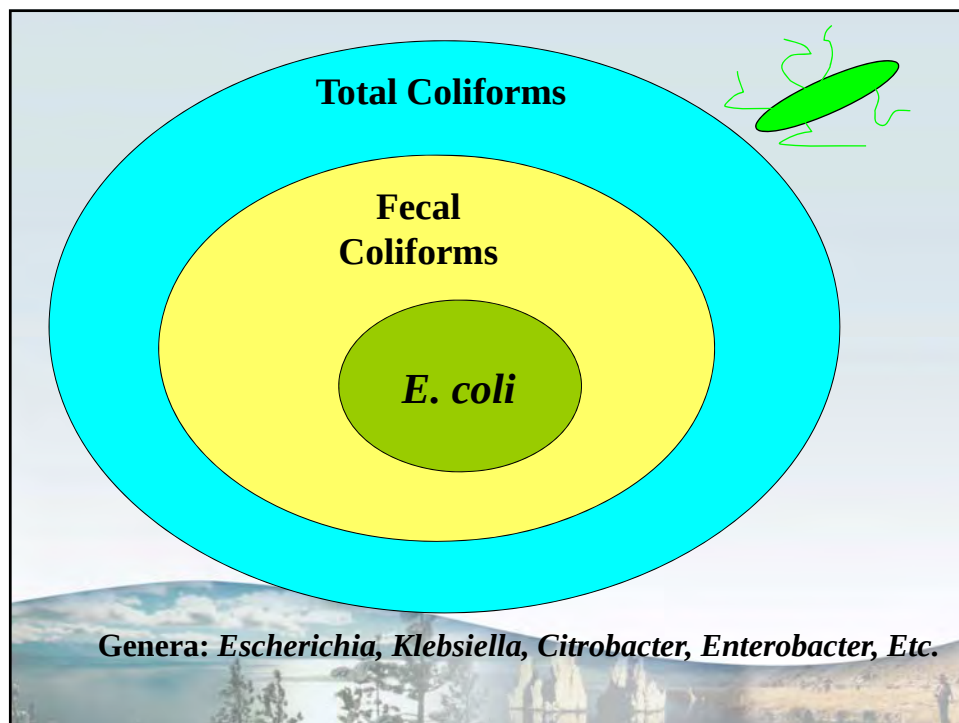
Current bacteria efforts

1. Ongoing CEDEN data upload
2. Five contracts (2 complete) and 1 grant for indicator bacteria / source tracking
3. Water Board bacteria sampling program for fecal coliform and *E. coli*

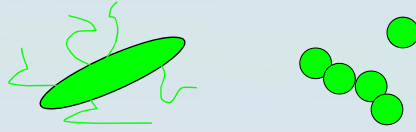
10/29/2014

Item No. 6

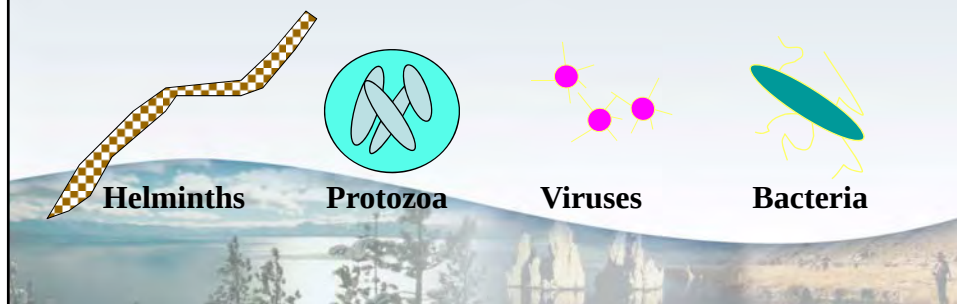
3



What are indicator bacteria?



Bacterial species (*commensal or beneficial*) that when present in water, food, etc. indicate the potential presence of fecal material and associated fecal pathogens (*overt virulence or opportunistic*). These can impact human health.



Bacteria commonly found in the gastrointestinal tract of the human body

<u>BACTERIUM</u>	<u>Lower GI</u>
Staphylococcus epidermidis	+
Staphylococcus aureus*	++
Streptococcus mitis	+/-
Enterococcus faecalis*	++
Streptococcus pyogenes*	+/-
Enterobacteriaceae*(Escherichia coli)	++
Proteus sp.	+
Pseudomonas aeruginosa*	+
Bacteroides sp.*	++
Bifidobacterium bifidum	++
Lactobacillus sp.	++
Clostridium sp.*	++
Clostridium tetani	+/-
Corynebacteria	+
Mycobacteria	+
Spirochetes	++
Mycoplasmas	+

++ = nearly 100 percent + = common (about 25 percent)

+/- = rare (less than 5%) * = potential pathogen

Data Analysis

CEDEN database: <http://www.ceden.org/>

3542 Fecal coliform samples

1550 Geomean calculations

132 Monitoring sites

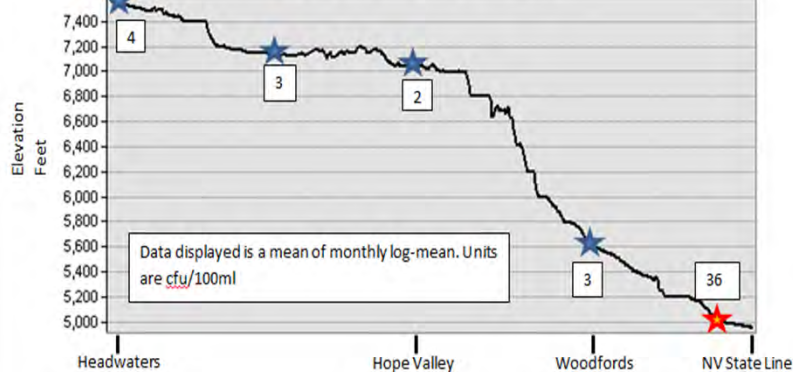
13 Hydrologic Units

10/29/2014

Item No. 6

7

West Fork Carson Elevation Profile

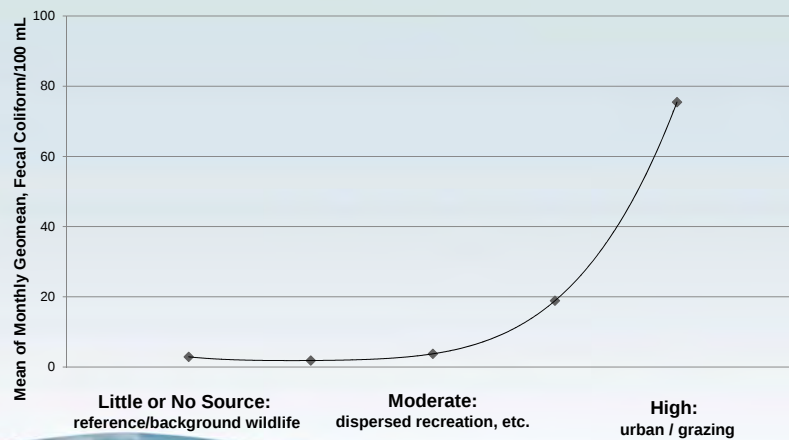


10/29/2014

Item No. 6

8

Fecal Coliform Mean of Monthly Geomeans by Source Intensity



10/29/2014

Item No. 6

9

Working Hypotheses

- Sources are wildlife, recreation, anthropogenic (human and livestock)
- Factors affecting fecal coliform concentrations are size of watershed, elevation, seasonality, flow regime
- Source intensity affects bacteria concentration

10/29/2014

Item No. 6

10

Preliminary Conclusions

- Sixty-four of 132 locations in the region meet the existing 20 fecal coliform per 100 mL standard. The majority of locations in the Lake Tahoe watershed meet the standard.
- Sixty-eight of 132 locations do not meet the 20 fecal coliform per 100 mL standard. The majority of these locations have evidence of anthropogenic influences.

10/29/2014

Item No. 6

11