

Recreational Waters Bacterial Monitoring Sampling and Analysis Plan



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Description of Program Elements

The overall goal of the Recreational Waters Bacterial Monitoring Program is to regularly monitor bacterial loads in the waters associated with public beaches within Gallatin County during times of peak use, and to take necessary corrective actions to protect public health.

Program Objectives include:

- Collection of surface water samples at beaches on a scheduled basis.
- Testing of all scheduled surface water samples for the presence of *E. coli* bacteria.
- Timely notification of the public of results via the City-County Health Department web site.

List and Description of Sites

<u>Site Description</u>	<u>Site ID</u>	<u>Latitude</u>	<u>Longitude</u>
Glen Lake beach access at East Gallatin Rec. Area	GLNLK	45.705125	-111.038160

Description of Monitoring Program

Samples will be collected for five consecutive days, once per month June-September. The actual sampling season may vary slightly. Samples will be tested for the presence in numbers (cfu) of *E. coli* bacteria.

Quality Assurance Objectives for Measurement of Data

Sample collection, completion of the Site Visit Form, and evaluation of the results to determine whether the water is safe for bathing purposes will be done by a local health officer or an authorized representative.

Completed Site Visit Forms will include potential contamination sources and their locations relative to the beach, as well as other data potentially relevant to bacterial loading. The indicator for microbial contamination analysis will be *E. coli* and EPA-approved methods will be used for water sample collection, storage, and laboratory analysis.

Sampling Procedures

Water samples will be collected and analyzed for five consecutive days, once per month June-September. Sampling frequency may be altered depending on circumstances. When samples are collected on consecutive days, every effort should be made to collect them at the same time of day, as the methods approved by Montana Department of Environmental Quality require samples to be obtained during separate 24-hour periods. Additional samples may be collected after a pollution event, heavy rainfall, or if the results from a previous sample exceeded water quality standards.

Samples will be collected at one foot below the surface of the water, in an area with a depth of at least 2 feet, within the area most frequently utilized by bathers. During one visit each month, a second sample will be collected at the same location as the first to serve as a duplicate sample. Additional samples are recommended at any inlets (storm drains, creek mouths, etc.).

Routine sample volumes will be at least 100 milliliters (ml), collected in a 200 ml Nasco® Whirl-Pak sample bag. Sample bags should be labeled with the Sample ID prior to sample collection with indelible (i.e. Sharpie) ink, using the following nomenclature: **MMDDYY-HHMM-Site ID**

Samples collected at the primary location (i.e. within the area most frequently utilized by bathers) do not need a further descriptor in the Sample ID; samples from any other locations should have a further descriptor added at the end. Possible examples include “-CRKMTH” at a creek mouth, or “-PIPE” at an outfall pipe.

Example: A sample collected at Glen Lake beach access at 9:00am on July 1, 2016 would be labeled 070116-0900-GLNLK. Note the use of military time.

Extreme care needs to be taken to avoid contaminating the sample and sample container. The Whirl-Pak seal should be removed just prior to obtaining each sample. Persons collecting a water sample should take care not to contaminate the sample by touching the inside of the container, rinsing the sample container, or transporting the samples in a common container with other environmental samples.

Adhering to sample preservation and holding time is critical to the production of reliable data. Samples should be stored and transported in a cooler with ice or icepacks, and delivered to the City of Bozeman Water Reclamation Facility Laboratory immediately upon collection. The time and date of collection should be recorded as described in the Sample Custody Procedures. Results should be reported to the Gallatin City-County Health Department in a timely manner.

Sample Custody Procedures

Samples should be collected by a local health officer or an authorized representative and delivered to the City of Bozeman Water Reclamation Facility Laboratory immediately upon collection. A completed Site Visit Form will verify that the samples were stored properly until it was relinquished to the laboratory.

Equipment Calibration Procedures and Frequency

There is no field instrumentation being used in this project that requires calibration. Laboratory instruments used for analyzing samples will be calibrated and used following the manufacturer’s guidelines and procedures.

Analytical Procedures

All samples will be assayed for *E. coli* using USEPA-approved method 1603.

Quality Control Checks

One field replicate (duplicate) will be used as quality control check during each monthly sampling event.

Method blanks will be used by a laboratory by passing clean matrix through all the analytical method steps to assess contamination resulting from laboratory procedures. Method blanks will be used at the discretion of the laboratory.

Data Quality Assessment

If *E. coli* results for duplicate samples have a relative percent difference (RPD) of greater than 10% in a regulatory scenario, all results from that sample are regarded as estimates and appropriate qualifiers are placed on the data. If the RPD is greater than 10% for this program, it is recommended that the local health officer include the associated “reduced confidence” in the dataset when results are reported to the public (**Equation 1**).

Equation 1: $RPD = [S_1 - S_2 / (S_1 + S_2) / 2] \times 100$, where S_1 and S_2 represent the results for the two duplicate samples.

Data Reporting

All data associated with this program, including results that do not warrant further action to protect public health, should be reported on the Gallatin City-County Health Department website in a timely manner. Completed Site Visit Forms (or scanned copies) should be delivered to the responsible health officer at the Gallatin City-County Health Department, and stored with program data.

The EPA recommended recreational water quality standard for full body contact swimming for *E. coli* is 235 organisms per 100 ml for any single sample. The threshold value recommended by the EPA in the 2012 Recreational Water Quality Criteria is a geometric mean of 126 colonies per 100 ml for all samples collected within a sampling period (**Equation 2**). Should either of these values be exceeded, the responsible health officer should use their discretion to take additional steps to inform the public of the associated health risks (**Table 1**).

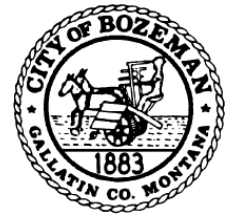
Equation 2: Geometric Mean = n^{th} root of: $(S_1 \times S_2 \times \dots \times S_n)$, where S_1 through S_n represent the results for the n samples.

Table 1: Program result scenarios and associated reporting actions.

Sample Result	Reporting Action
Result <235 cfu/100 ml for <i>any</i> sample collected at a site during a single visit	Results reported in a timely manner on City-County Health Department website.
A geometric mean <126 cfu/100 ml for <i>all</i> samples collected at a site during a month	
Result >235 cfu/100 ml for <i>any</i> sample collected at a site during a single visit	Results reported in a timely manner on City-County Health Department website. PLUS additional steps to inform the public of the health risk, per the discretion of the health officer.
A geometric mean >126 cfu/100 ml for <i>all</i> samples collected at a site during a month	
RPD > 10% for duplicates collected at a site	Associated “reduced confidence” reported with results.



Recreational Waters Bacterial Monitoring Site Visit Form



Site ID:	Site Description:		
Date:	Time:	Name:	

Weather								
cloud cover:	0-25%	25-50%	50-75%	75-100%				
current precipitation:	none	light	moderate	heavy				
recent (36 hours) precipitation:	none	light	moderate	heavy				
wind intensity:	none	light	moderate	heavy				
wind direction (wind coming from):	N	NE	E	SE	S	SW	W	NW
Comments/Observations:								

Potential Pollution Sources (if present, provide details in comments)			
dead fish/animals:	Absent	Present	comment:
wildlife/pet waste:	Absent	Present	comment:
outfall/pipe:	Absent	Present	comment:
beach debris/litter:	Absent	Present	comment:
floating debris/litter:	Absent	Present	comment:
waterfowl:	Absent	Present	comment:
dogs:	Absent	Present	comment:
bathers:	Absent	Present	comment:
Comments/Observations:			

Water Quality Observations				
turbidity	<input type="checkbox"/> clear	<input type="checkbox"/> slightly turbid	<input type="checkbox"/> turbid	<input type="checkbox"/> opaque
odor	Absent	Present	comment:	
surface sheen	Absent	Present	comment:	
algae	Absent	Present	comment:	
Comments/Observations:				

Water Quality Samples					
Sample Type:	<input type="checkbox"/> bacteria <input type="checkbox"/> other:			Sample Time:	
stored/transported on ice?	YES	NO	Time Relinquished to Lab:		
Comments/Observations:					