Bacterial Monitoring Plan

for

Canyon Lake

Submitted by:

Lake Elsinore San Jacinto River Authority

Revised Draft 14 August 2008

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1.0 Background & Purpose

Canyon Lake was formed when Railroad Canyon dam was constructed on the San Jacinto River approximately five miles upstream of Lake Elsinore. The entire watershed encompasses 780 square miles in southwest Riverside County.

Bacterial levels in Canyon Lake have exceeded applicable water quality objectives specified in the Santa Ana Regional Water Quality Control Plan (aka "Basin Plan").[1] Consequently, the lake has been periodically closed to recreational uses to protect public health. And, in 1998, Canyon Lake was added to California's 303(d) list of impaired waterbodies due to excessive fecal coliform concentrations.

The current Basin Plan specifies the use of fecal coliform concentrations as the primary indicator of bacterial pollution. However, EPA has recommended using *Escherichia coli* (E. *coli*) as a more reliable measure of potential risk to swimmers. As a result, the Regional Water Quality Control Board for the Santa Ana Region ("Regional Board") is planning to update the Basin Plan in 2009 to replace fecal coliform with E. *coli* as the primary indicator of contamination by waterborne pathogens.

Preliminary water quality monitoring data indicates that the E. *coli* concentrations in Canyon Lake are presently meeting EPA's recommended water quality criteria for bacteria during dry weather conditions (see Appendix A). If additional water quality monitoring demonstrates that Canyon Lake consistently complies with the new E. *coli* objectives, then the Regional Board may elect to remove it from the state's list of impaired waterbodies. Alternatively, the data may show that the lake is incompliance during dry weather but out of compliance when stormwater runoff is occurring. Were that to be the case, seasonal solutions could be considered.

A wet weather water quality sampling program has been underway in Canyon Lake for a number of years.[2] This program, developed in cooperation with the California Department of Public Health and the Regional Board, is managed by Elsinore Valley Municipal Water District (EVMWD). The existing program bacterial monitoring program focuses on collecting water quality data during and after rain storms. The laboratory results are used to determine when water contact recreation should be suspended and warning signs posted around Canyon Lake.

The residents of the San Jacinto watershed, acting through various public and private stakeholder groups, have volunteered to expand the current water quality monitoring program to better characterize bacteria concentrations during the dry weather conditions which predominate at Canyon Lake. Data from the new monitoring program will be used to assess compliance with existing and proposed water quality objectives, reevaluate the appropriateness of the 303(d) listing and, if necessary, develop and implement a Total Maximum Daily Load (TMDL).

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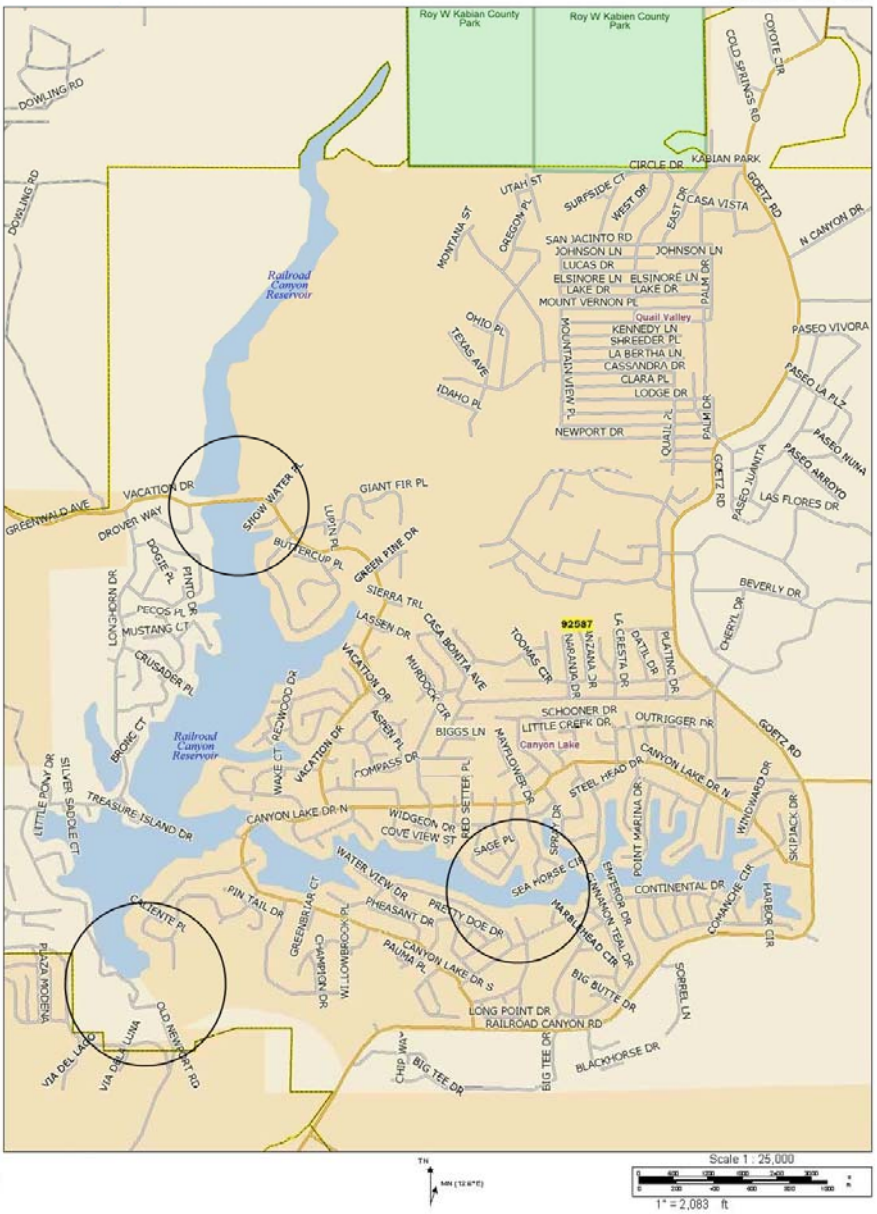
[1] Anderson, M.A. et al. The Occurrence and Distribution of Indicator Bacteria in Canyon Lake. Dec., 2002.
[2] A copy of the Canyon Lake Stormwater Bacteria Sampling Protocol is attached as Appendix B.

2) Sampling Locations

Water samples will be collected from three locations (see Fig. 1). The first will be located at the upper end of the main body near the bridge at Vacation Drive. The second will be located at the bottom end of the main body near Railroad Canyon dam. The third will be located near the midpoint of the bay east of Canyon Lake Dr. Final sampling locations will be selected to fairly characterize the water quality to which a swimmer is most likely to come into contact. Where possible, locations will also be selected to coordinate sampling efforts with other on-going water quality monitoring programs in Canyon Lake. Each location will be identified on a scale map of the lake and GPS coordinates will be provided.

Fig. 1: Proposed Sampling Locations in Canyon Lake



3) Analytical Parameters and Methods

Each sample will be analyzed for fecal coliform and E. *coli*. In addition, water temperature, pH, and conductivity will be documented at the time of sampling using well-calibrated field probes. All samples will be grab samples collected, using properly sterilized equipment, approximately 2 feet (± 1 foot) below the surface of the lake.

Samples will be properly preserved and shipped within prescribed holding times for the applicable analytical method. Appropriate chain-of-custody documentation will be maintained for each sample throughout the transport process.

Each sample will be analyzed by a certified laboratory using standard methods approved by U.S. EPA or other appropriate state agency (e.g. California Department of Public Health or State Water Resources Control Board). Additional special samples (blanks, spikes and duplicates) will be prepared and submitted in order to demonstrate acceptable quality assurance and quality control throughout the sampling and analytical process.

All sampling, data analysis and reporting procedures for pathogen indicator bacteria will conform to the requirements specified in the California State Water Resources Control Board's Surface Water Ambient Monitoring Program (SWAMP).

4) Sampling Schedule

Samples will be collected and analyzed from each designated location in accordance with the schedule described in Table 1.

Table 1: Enhanced Sampling Schedule to Characterize Bacteria in Canyon Lake

Sampling Dates	Frequency	N-of-Samples
Feb. 15 – Apr. 15	Once-a-week	8 weeks
June 15 – Aug. 15	Once-a-week	8 weeks
Oct. 15– Dec. 15	Once-a-week	8 weeks

The water quality objective for both fecal coliform and E. coli is specified as the geometric mean of at least 5-samples collected in a 30-day period. The prescribed monitoring program is adequate to calculate four rolling geometric means for each location in each sampling period. Therefore, at the conclusion of the one year study period, the stakeholders will be able to report a total of 36 different geometric means for Canyon Lake. EPA guidance strongly recommends that geometric means, rather than single sample results, be used to assess compliance with water quality standards. And, state guidance specifies a minimum of 28 separate geometric means are needed to determine the lake's proper status on California's 303(d) list of impaired waterbodies.

5) Data Management and Reporting

The results of all sampling and analyses will be compiled in the existing water quality database presently maintained by the Lake Elsinore San Jacinto Watershed Authority (LESJWA) and managed by the Santa Ana Watershed Project Authority (SAWPA). Electronic copies of the data will be made available, on CD, with the annual report and at any other time a written request is received from the Regional Board.

Adequate safeguards (e.g. data validation tools) will be implemented to ensure that information entered into the database accurately reflects the actual results reported by the laboratories analyzing the water quality samples. Hard copies of all laboratory reports will be archived for a period of at least 10 years. Thereafter, the original reports may be scanned and converted to electronic images (e.g. PDF files) for permanent storage.

Adequate safeguards (e.g. password protection and access logging) will also be implemented to ensure that information in the database cannot be altered without authorization. Full back-up copies of the database will be made once each month and stored in a secure location.

The results of all sampling and analyses performed as part of the monitoring plan will be reported to the Regional Board, in tabular form, within 30-days after the data is received from the laboratory. A final report summarizing and interpreting the data will be submitted to the Regional Board no more than 90 days after the laboratory reports results from the final sampling period. The annual reports will include a statistical analysis of the data noting any relevant spatial or seasonal differences observed. The annual report will also evaluate the sampling data to assess compliance with the existing and proposed water quality objectives.

In addition, the final report will include specific recommendations consistent with the results of the study. For example, if the data reveals that Canyon Lake is meeting relevant water quality objectives for pathogen indicator bacteria, then it is likely that the stakeholders will recommend the lake be removed from the 303(d) list. However, if the data shows that bacteria levels in Canyon Lake are routinely exceeding water quality objectives, then the stakeholders will prepare and submit an appropriate plan to investigate and remediate the man-made source(s) of contamination.

Hard copies of all laboratory reports, including any QA/QC data, will be included as an appendix to the annual report. A copy of the electronic database, containing all data collected will also be provided (on CD) with the annual report.

6) Coordination with Existing Monitoring Programs

Wherever and whenever possible, the stakeholders will make every reasonable effort to ensure a high level of consistency and integration between the existing wet weather monitoring program and the proposed plan to characterize bacteria concentrations during dry weather. This includes the selection of sampling locations, analytical methods, and reporting procedures.

Appendix A:

Summary of Bacteria Monitoring Results
(2000-2007)

	A	B	C	D	E	F
1	**Canyon Beach Sampling Results 2000-Present**					
2	Results in MPN / 100mL					
3						
4			E. Coli			
5	Date	Intakes	North Causeway	Indian Beach	Sierra Park	East Bay
6	1/24/00	3.1	1	11	53.8	55.8
7	2/15/00	30	<1	10.8	31.3	10.8
8	3/16/00	3.1	14.1	<1	114.3	62
9	4/27/00	272.3	3.1	7.4	1	5.2
10	5/26/00	<1	2	13.2	3.1	5.2
11	6/26/00	<1	<1	15.5	1	<1
12	7/20/00	<1	<1	<1	<1	<1
13	8/28/00	2	6.3	6.3	2	46.4
14	9/18/00	3.1	<1	32.9	<1	<1
15	10/30/00	3.1	3	257.7	98.8	53.8
16	11/15/00	3	<1	9.6	20.3	6.3
17	12/13/00	12.1	5.2	51.2	111.2	20.3
18	1/24/01	5.2	5.2	35	53.7	7.4
19	2/13/01	4.1	6.3	201.4	206.3	488.4
20	3/19/01	<1	2	22.8	<1	<1
21	4/9/01	5.2	4.1	13.2	25.9	1
22	5/21/01	<1	1	5.2	1	<1
23	6/21/01	<1	1	11.9	1	<1
24	7/5/01	<1	<1	38.8	12.1	3
25	8/13/01	<10	<10	20	20	<10
26	9/10/01	<10	<10	6294	41	10
27	10/30/01	<1	<1	<1	1	1
28	11/25/01	33.6	1	47.1	107.6	235.9
29	12/13/01	8.5	2	33.1	43.9	1
30	Jan-02	2	6	194	6	15
31	Feb-02	4	1	9	3	3
32	Mar-02	1	1	5	1	1
33	Apr-02	4	2	18	9	1
34	May-02	2	4	22	4	4
35	Jun-02	1	30	300	70	7
36	Jul-02	1	4	8	23	7
37	Aug-02	2	1	8	4	2
38	Sep-02	1	1	30	7	13
39	Oct-02	1	1	23	30	80
40	Nov-02	13	1	1	220	13
41	Dec-02	22	300	500	220	170
42	Jan-03	1	5.2	15.8	4.1	9.5
43	Feb-03	23.3	27.5	21.8	25.9	35.5
44	Mar-03	1	4.1	9.8	1.1	6.3
45	Apr-03	6.3	24.3	29.2	3.1	3
46	May-03	10	10	10	10	10
47	Jun-03	10	31	2	9.8	1.1
48	Jul-03	1	1	1	1.1	1.1
49	8/14/03	1	1	104.3	1.1	1.1
50	8/18/03	1	1	10	6.3	1.1
51	8/28/03	1	1	4.1	1	1
52	9/2/03	1	1	2	2	1
53	10/24/03	10	10	20	12	1
54	10/27/03	2	2	10	10	3.1
55	11/20/03	10	1	14.6	3.1	1
56	11/24/03	5.2	1	5.2	10	3.1
57	12/11/03	4.1	1	9.8	16	2
58	12/15/03	3.1	2	31	22.6	2
59	1/22/04	4.1	2	20	10	2
60	1/26/04	17.1	1	6.3	20	1
61	2/19/04	2	2	20	31	10
62	2/23/04	8	64	146	20	1300

	A	B	C	D	E	F
1	**Canyon Beach Sampling Results 2000-Present**					
2	Results in MPN / 100mL					
3						
4			E. Coli			
5	Date	Intakes	North Causeway	Indian Beach	Sierra Park	East Bay
63	3/11/04	1	20	1	3	1
64	3/15/04	1	11	27	1	1
65	4/1/04	1	1	6.2	20	10
66	4/5/04	10	3	10	7.3	20
67	5/13/04	10	2	8	1	1
68	5/17/04	10	4.1	33.6	3.1	20
69	6/10/04	1	10	85	17.5	2
70	6/14/04	1	4	246	2	20
71	6/16/04			7		
72	7/8/04	2	1	31	1	1
73	7/12/04	1	1	30	63	3
74	8/12/04	10	1	10	3	1
75	8/16/04	1	10	74	1	1
76	9/16/04	1	1	10	1	1
77	9/20/04	3.1	2	31	10	41
78	10/7/04	1	1	52	1	1
79	10/11/04	2	1	22	1	9
80	11/4/04	56	171	160	30	32
81	11/8/04	20	37	1120	50	51
82	11/16/04	2	52	31	16	17
83	11/23/04	24	341	3255	41	290
84	12/1/04	31	41	32.3	10.9	13.4
85	12/8/04	5	10	276	4	109
86	12/14/04			86		10
87	12/20/04			41		
88	1/19/05	21	114	66	52	20
89	1/27/05	52	14	387	16	17
90	2/2/05	31	52	2419	20	20
91	2/10/05			59		
92	2/17/05		71	104	69	
93	3/7/05	30	20	2	41	
94	4/12/05	1	10	4	1	1
95	5/12/05	1	10	31	5	1
96	6/14/05	3	2	64	1	1
97	8/17/05	2	1	3	2	1
98	9/15/05	2	2	15	12	4
99	10/24/05	10	6	8	4	4
100	11/16/05	13	1	10	30	5
101	12/13/05	7	1	16	12	1
102	1/30/06	4	1	14	20	3
103	2/27/06	2	1	16	6	1
104	3/28/06	2	2	365	3	2
105	3/30/06			11		
106	4/13/06	6	5	4	1	1
107	5/24/06	1	1	8	10	10
108	6/12/06	52	1	36	1	1
109	7/27/06	3	8	15	1	22
110	8/29/06	1	2	18	10	7
111	9/28/06	3	2	14	4	1
112	10/24/06	8	1	48	21	1
113	11/8/06	11	3	12	13	1
114	12/5/06	6	2	52	4	4

Appendix B:

Canyon Lake Stormwater Bacteria Sampling Protocol

Canyon Lake Stormwater Bacteria Sampling Protocol

Purpose

The purpose of this document is to outline the proposed storm water sampling protocol for the Canyon Lake. This document includes locations, frequency, procedures and reporting information. The water quality standards in this document would not substitute for existing or future regulations by any federal or state agency. These standards are intended as a reference for local governing bodies and Canyon Lake only.

This program is separate from the EVMWD Canyon Lake Water Treatment Plant requirements for supply water sampling.

Parties

The City of Canyon Lake, Canyon Lake Property Owners Association (POA) and EVMWD are the parties for implementing this storm water sampling protocol. Divisions of responsibilities are outlined below:

1) The City will coordinate the posting of warning signs in public access areas, following significant storm events. The signs shall state in English and Spanish "Warning: Contaminated Water". The POA hotline will activate with a statement regarding the potential contamination of the lake water.
2) After posting, when runoff subsides, usually within 72 hours, sampling to begin on a daily basis until results reach a safe body contact level. The City or, at the City's request, the POA staff will collect the samples and deliver them to the EVMWD laboratory per the guidelines stated in this document.
3) The POA should determine whether the contamination is significant enough to warrant closure of the lake, or portions of the lake, for body contact activities such as swimming and water skiing. If a lake closure is needed, the POA will coordinate the physical facilities and the posting of signs for the closure. The POA should also notify the news media regarding the lake closure for body contact activities.
4) If body contact is determined to be an issue, the POA hotline should also inform the residents of the closure of the lake, or portions of the lake, for body contact activities.
5) The City will notify the news media (Press Enterprise, Californian and Friday Flyer) regarding contamination.
6) Upon reaching a safe level, all signs will be removed, hotline will be updated, and the news media will again be notified.

7) EVMWD will accept and test all the samples collected by the City or the POA per the sampling and submitting procedures in this document.
8) EVMWD will distribute the laboratory results by emails and written reports to the list of persons noted in this document.

When implementing these procedures, the City staff shall coordinate and notify the Riverside County Department of Environmental Health, the POA's Operations Department, and EVMWD.

Bacteria Water Quality Standards for Recreation Areas in Canyon Lake

The indicator for safe body contact shall be a result of less than 235 MPN / 100ml E. Coli as specified in the City of Canyon Lake Stormwater Runoff Protocol dated June 20, 2005.

Sampling Locations

Five designated locations in Canyon Lake are included in this bacteria sampling program.

East Port
Gold Cove
Indian Beach
Sierra Park
North Causeway –Slalom Course side

Sampling Date and Frequency

Sampling will occur on a daily basis Monday through Friday, usually 72 hours after significant amount of rainfall. Sample collection at each location shall be discontinued after the first E. Coli result of less than 235 MPN/100 ml is obtained.

The holding time for source water samples for bacteria testing is 6 hours. The sampler should deliver the samples to EVMWD Laboratory as soon as possible, preferably at least one (1) hour before the expiration of the holding time limit.

Sample Delivery

1. Deliver samples to EVMWD Laboratory at 14980 Strickland Ave. Ring the doorbell for entry to the Laboratory building. A wastewater operator or laboratory personnel will accept the samples and sign the chain-of-custody form. If new sample bottles or chain-of-custody forms are needed, please pick them up at that time. If no one responds to the door bell to open the door, please call the cell phone numbers listed below for assistance.

2. The EVMWD Laboratory will accept samples Monday-Friday between 7:30 A.M. and 3:00 P.M. only. The main gate is open during delivery hours, on regular work days. In case that it is closed, please call the phone numbers below to obtain access information.

3. Notify EVMWD Water Quality Lab prior to sample collection at one of the following numbers:
   (951) 674-3146 x8305
   (951) 674-3146 x8245
   (Cell Phone) 951-258-9332
   (Cell Phone) 951-903-9815
   If you reach voice mail, please try the next number.

Sampling Procedures

1. Fill supplied bottles at each sample location.

   a. Sample bottles and required paperwork will be provided.
   b. Remove security seal and cap immediately before sampling.
   c. Lower the bottle to six inches below the surface of the water.
   d. Fill bottle to the 100 mL line or above and replace cap immediately.
   e. Fill one (1) bottle at each sample location.
   f. Label bottle with sample location and collection date/time.
   g. Store bottle in cooler with blue ice.

2. Complete the supplied Chain-of-Custody form by entering the following information:

   a. Location, Date and Time for each sample
   b. Name and signature of person collecting samples.
   c. Name and signature of person delivering samples to EVMWD along with date and time of delivery.

Test Methods

The samples will be tested for E. Coli. The upper limit for the test will be 2420 MPN/100ml. Results above this will be reported as >2420.

E. Coli	Colilert, Quantitray (Idexx), Standard Method 9223

The method employed by EVMWD is approved by the U.S. EPA for analysis of source water samples. The test is capable of producing quantitative results (# per 100 ml) in 24 hours. The E. Coli test is currently not approved for source water testing of regulatory samples by the California Department of Health Services Environmental Laboratory Accreditation Program (DHSELAP). Results can not be submitted to the Regional Board or DHS to fulfill regulatory reporting requirements.

Reporting

Results will be reported by 10:00 A.M. on the second day after sample collection:
(For report status, please call Chantal Stapleton at (951) 674-3146 x8243)

a. Email
   i. Kathy Bennett, Kathy@cityofcanyonlake.com
   ii. Bernie Strojny, Citymanager@cityofcanyonlake.com
   iii. Paul Johnson, pjohnson@canyonlakepoa.com
   iv. Sandy Healy, shealy@canyonlakepoa.com
   v. Clint Warrell, cwarrell@canyonlakepoa.com
   vi. Jim Gillis, RCDEH, JGillis@co.riverside.ca.us
   vii. Cindy Li, RWQCB, cli@rb8.swrcb.ca.gov
   viii. Ron Young, ryoung@evmwd.net
   ix. Phil Miller, philmiller@evmwd.net
   x. Julius Ma, jma@evmwd.net

b. Mail – Official Report

Canyon Lake POA
31512 Railroad Canyon Road
Canyon Lake, CA 92587
Attn: Sandy Healy

City of Canyon Lake
31516 Railroad Canyon Road
Canyon Lake, CA 92587
Attn: R. Bohan

Contact Persons

Canyon Lake POA
Operations Department (Sandy Healy)
951-244-6841, Ext. 514
Shealy@canyonlakepoa.com

City of Canyon Lake
Bob Bohan
951-244-2955

EVMWD
Chantal Stapleton
951-674-32146, Ext. 8243
Chantal@evmwd.net

CC: Ronald Young, General Manager
Chantal Stapleton, Laboratory Supervisor
Paul Johnson, CLPOA
Clint Warrell, CLPOA
Sandy Healy, CLPOA
Bernie Strojny, City of Canyon Lake
Kathy Bennett, City of Canyon Lake