

Little River at Crannell Road Salinity Study

North Coast Regional Water Quality Control Board

Project Code: RWB1_Coastal Pathogen

Approvals

Role	Name	Signature with Date
Project Lead	Mary Bartholomew	
QA/QC Manager	Michael Thomas	

Purpose of Study

The purpose of this Regional Board study is to determine whether sampling station Little River at Crannell is categorized as fresh water or saline water for the purpose of assessing bacteria data for support of the water contact recreation beneficial use.

Background

Little River is a river located in Humboldt County. It is 19.6 miles long and flows to the Pacific Ocean between Little River State Beach and Moonstone Beach County Park. Bacteria data has been collected from Little River and will be assessed for the protection of water contact recreation. There are statewide bacteria provisions in Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California (California State Water Resource Control Board, 2019), where the applicable water quality objective is based on salinity. *Escherichia coli* (*E. coli*) is assessed when the salinity is equal to or less than one part per thousand 95 percent or more of the time and Enterococci is assessed when salinity is greater than one part per thousand more than five percent of the time.

Following protocol established in the California Regional Water Quality Control Board, North Coast Region, [Coastal Pathogen Project Salinity Study](#) (2022), a desktop analysis of the sampling sites determined the elevation of sampling sites using the spot elevation tool in topoView (n.d.). The latitude and longitude of the sampling locations were obtained from the California Environmental Data Exchange Network (n.d.). A map of sampling locations is shown in Figure 1.

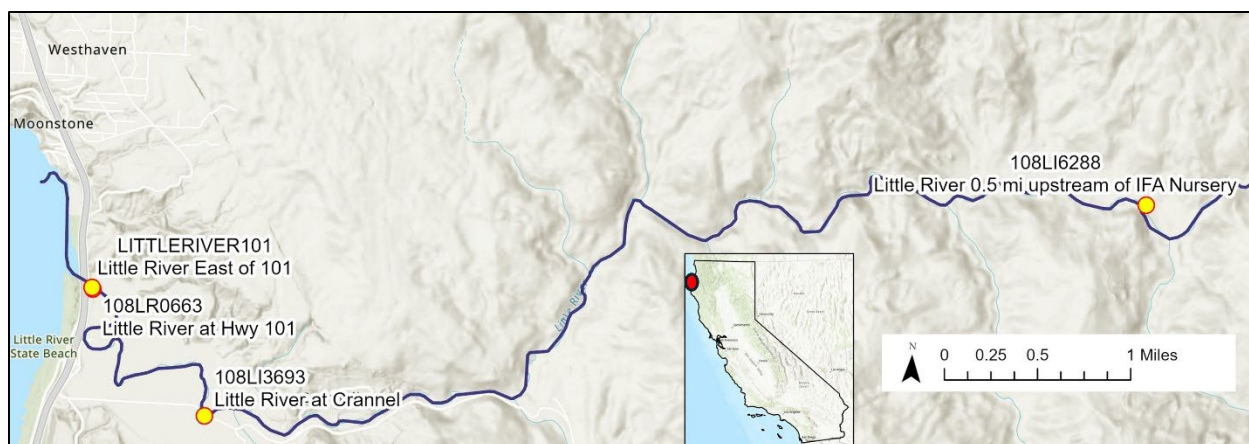


Figure 1. Little River Bacteria Sampling Stations

Section III.2 (Bacteria Water Quality Objectives) of Part 3 of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, Bacteria Provisions and a Water Quality Standards Variance Policy (Bacteria ISWEBE) specifies that the water quality objective for the REC-1 beneficial use is assessed using *Escherichia coli* (*E. coli*) in fresh water and Enterococci in saline water. The project's intended use category is to collect ambient data to support Integrated Report development. The below definitions from the Bacteria ISWEBE will be used to determine if sample water at the site is fresh or saline water (Table 1).

Table 1. Definitions and Indicator Bacteria for Fresh and Saline Water

Applicable Waters	Objective Indicator Bacteria
<i>Fresh Water:</i> All waters where salinity is equal to or less than 1 ppt 95 percent or more of the time	<i>E. coli</i>
<i>Saline Water:</i> All waters where the salinity is greater than 1 ppt more than 5 percent of the time	Enterococci

Salinity has been assigned to three of the four sampling stations (Table 2). Little River at Hwy 101 was sampled for salinity on March 1, 2022 and the water was determined to be saline. Little River East of 101 is approximately 40 feet downstream and assumed to also be saline. Sample sites at an elevation of at least 50 feet are identified as freshwater. Little River 0.5 mi upstream of IFA Nursery is at an elevation greater than 50 feet and is assumed to be freshwater. The purpose of this study is to determine whether Little River at Crannel is fresh water or saline at an elevation of 16 feet.

Table 2. Little River Station Codes and Names

Station Code	Station Name	Elevation (feet)	Water Salinity
LITTLERIVER101	Little River East of 101	4	Saline
108LR0663	Little River at Hwy 101	4	Saline
108LI3693	Little River at Crannel	16	unknown
108LI6288	Little River 0.5 mi upstream of IFA Nursery	314	Fresh

Sample sites less than 50 feet in elevation are sampled during the high-high tide and low-low tide when the high-high is at least 95% of all high tides as influenced by moon phases (United States Naval Observatory, n.d.) and by using tide predictions by the National Oceanic and Atmospheric Administration (n.d.). The 95% value was determined using the formula $0.95 \cdot (n-1) + 1 = 95\%$ value, where n is the number of values sorted largest to smallest. For the 2025 calendar year, 95% of all high tides is a high tide of at least 7.66 feet. Between October 2025 and the end of the calendar year, there are six high-high tides during daylight hours. For the 2026 calendar year, 95% of all high tides is a high tide of at least 7.68 feet. Between January and June of the 2026 calendar year, there are nine high-high tides during daylight hours.

Attachment 1 contains the dates of qualifying high-high tides. Low-low tides in parentheses are not in the top 5% of low-low tides. Highlighted dates are those when the high and low tides happen during or in proximity to daylight hours.

Monitoring Design

Location

Water Board staff will collect salinity data at the Little River at Crannell sampling station (Figure 2). Staff will access the river at a designated location (Figure 3) and obtain any landowner permissions, if needed.



Figure 2. Map of route from Hwy 101 to Little River at Crannell Rd (41.010368, -124.094677, WGS84)



Figure 3. Map showing access location to Little River

Sampling

Timing

Staff will collect salinity data during a qualifying high tide and when there is no greater than 0.1-inch of precipitation each day during the previous three days, as determined using the National Weather Service (n.d.) website. The salinity reading using a calibrated YSI® sonde will be taken within one hour of the predicted high-high and low-low tides. Continuous monitoring is not being considered because retrieval of the sonde may be unsafe during winter storm months. Weather will be tracked using the National Weather Service (n.d.) website. Salinity data will be collected when there is no greater than 0.1-inch of precipitation on each of the three days preceding the data collection, as reported by the National Weather Service (n.d.).

Field Equipment and Supplies

Multimeter – A clean and calibrated YSI© multimeter sonde with a salinity sensor reading in parts per thousand (ppt) will be used to collect instantaneous measurements.

Field Monitoring Form – A field monitoring form (Attachment 2), pen, and clipboard will be supplied to collect water quality data and record field conditions.

Field Checklist – Please see Attachment 3 for Field Checklist.

Field Gear Cleaning

Gear and equipment will be thoroughly scrubbed with a stiff-bristled brush to remove any organisms. After gear is completely dry, keep dry for at least 48 hours so any remaining organisms may desiccate. If drying for 48 hours is not possible, place in a 32° F freezer for 8 hours.

Data Analysis

Salinity will be determined based on the definitions in Bacteria ISWEBE (Table 1).

Fresh Water	All waters where salinity is equal to or less than 1 ppt 95 percent or more of the time
Saline Water	All waters where the salinity is greater than 1 ppt more than 5 percent of the time

Data Storage

The field sheet will be scanned and electronically stored in the following folder: (R:)RB > RB1 > Shared > TMDL > Coastal_Pathogen_Project > Monitoring and Data > Salinity Monitoring

Regional Board staff will ensure the salinity determination for Little River at Crannel Road is updated in the California Water Quality Assessment (CalWQA) database.

Quality Assurance

Contact List

Monitoring Lead – Mary Bartholomew

Role: Monitoring event organizer

Email: Mary.Bartholomew@waterboards.ca.gov

Phone: 707-576-2662

Address: 5550 Skylane Blvd., Santa Rosa, CA 95403

Regional Monitoring Coordinator – Michael Thomas

Role: QA/QC manager

Email: Michael.Thomas@waterboards.ca.gov

Phone: 707-576-2553

Address: 5550 Skylane Blvd., Santa Rosa, CA 95403

Quality Control

- Field equipment is calibrated and checked following established protocols.
- Instantaneous measurements of water chemistry will be duplicated by collecting a second set of measurements immediately after initial measurements.
- Field staff are trained in the field sampling procedures.

Standard Operating Procedures

The study will follow SWAMP Field Measurements and Water and Sediment Sample Collection SOP (MPSL-2014).

Measurement Quality Objectives (MQO)

The MQOs applicable to the study are SWAMP Programmatic MQOs.

Data Verification

The data requires SWAMP Data Verification.

Quality Assurance Project Plan

The following sources are used to establish quality assurance and quality control standards and procedures to this monitoring project to produce data that are scientifically valid and defensible, and of known documented quality.

- The Coastal Watershed Pathogen Indicator Study Quality Assurance Project Plan was developed for pollutant verification of waterbodies placed on the 303(d) list as impaired by pathogens. Jolly Giant Creek was included in the study and this is further sampling to identify the extent and sources of the impairment.
- The Surface Water Ambient Monitoring Program Quality Assurance Program Plan is a statewide plan that establishes the requirements for collecting data. The plan addresses program administration, project management and coordination, quality assurance and data management, and field, laboratory, and technical services.

Citations

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<https://www.weather.gov/wrh/WxTable?LAT=41.0197&LNG=-124.1061&DAYS=7&INT=1>

topoView (n.d.). *Spot Elevation*. United States Geological Society.

Retrieved on October 21, 2025 from

<https://ngmdb.usgs.gov/topoview/viewer>

United States Naval Observatory (n.d.). *Moon Phases*. United States Navy.

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<https://aa.usno.navy.mil/data/MoonPhases>

Attachment 1 – Qualifying High Tides

Day	Date	High Time	High Feet	Low Time	Low Feet	Sunrise	Sunset
Tuesday	11/4/2025	9:45 AM	7.74	(4:43 PM)	(-1.02)	6:51 AM	5:08 PM
Wednesday	11/5/2025	10:22 AM	8.11	5:19 PM	-1.6	6:52 AM	5:07 PM
Thursday	11/6/2025	11:03 AM	8.28	6:07 PM	-1.88	6:53 AM	5:06 PM
Friday	11/7/2025	11:47 AM	8.21	6:57 PM	-1.84	6:54 AM	5:05 PM
Saturday	11/8/2025	12:34 PM	7.91	7:51 PM	-1.54	6:56 AM	5:04 PM
Tuesday	12/2/2025	8:26 AM	7.81	(3:31 PM)	(-0.75)	7:23 AM	4:49 PM
Wednesday	12/3/2025	9:09 AM	8.22	4:19 PM	-1.47	7:24 AM	4:49 PM
Thursday	12/4/2025	9:54 AM	8.48	5:08 PM	-1.91	7:24 AM	4:48 PM
Friday	12/5/2025	10:41 AM	8.54	5:56 PM	-2.06	7:25 AM	4:48 PM
Saturday	12/6/2025	11:30 AM	8.38	6:46 PM	-1.94	7:25 AM	4:48 PM
Sunday	12/7/2025	12:21 PM	8.00	7:36 PM	-1.58	7:27 AM	4:48 PM
Tuesday	12/30/2025	7:01 AM	7.66	(2:24 PM)	(-0.11)	7:40 AM	4:58 PM
Wednesday	12/31/2025	7:52 AM	8.01	(3:18 PM)	(-0.86)	7:40 AM	4:59 PM
Thursday	1/1/2026	8:45 AM	8.24	4:09 PM	-1.4	7:40 AM	4:59 PM
Friday	1/2/2026	9:39 AM	8.41	4:58 PM	-1.72	7:41 AM	5:00 PM
Saturday	1/3/2026	10:32 AM	8.42	5:45 PM	-1.8	7:41 AM	5:01 PM
Sunday	1/4/2026	11:23 AM	8.24	6:30 PM	-1.64	7:41 AM	5:02 PM
Monday	1/5/2026	12:14 PM	7.83	(7:13 PM)	(-1.25)	7:41 AM	5:03 PM
Friday	1/30/2026	8:37 AM	7.86	(3:59 PM)	(-1.09)	7:28 AM	5:31 PM
Saturday	1/31/2026	9:35 AM	7.99	(4:46 PM)	(-1.30)	7:27 AM	5:33 PM
Sunday	2/1/2026	10:28 AM	7.99	(5:29 PM)	(-1.30)	7:26 AM	5:34 PM
Monday	2/2/2026	11:18 AM	7.79	(6:08 PM)	(-1.07)	7:25 AM	5:35 PM
Saturday	5/16/2026	11:38 PM	7.80	5:58 AM	-1.79	5:58 AM	8:28 PM
Monday	5/18/2026	12:23 AM	7.85	7:35 AM	-2.30	5:56 AM	8:30 PM
Tuesday	5/19/2026	1:12 AM	7.68	8:27 AM	-2.15	5:56 AM	8:31 PM
Saturday	6/13/2026	10:26 PM	7.87	4:55 AM	-1.53	5:44 AM	8:49 PM
Sunday	6/14/2026	11:17 PM	8.03	5:45 AM	-2.07	5:44 AM	8:49 PM
Tuesday	6/16/2026	12:08 AM	8.01	7:24 AM	-2.39	5:44 AM	8:50 PM
Wednesday	6/17/2026	1:01 AM	7.76	8:13 AM	-2.18	5:44 AM	8:50 PM
Saturday	7/11/2026	9:14 PM	7.68	(3:48 AM)	(-0.85)	5:56 AM	8:48 PM
Sunday	7/12/2026	10:11 PM	7.93	4:42 AM	-1.45	5:56 AM	8:48 PM
Monday	7/13/2026	11:07 PM	8.05	5:33 AM	-1.87	5:56 AM	8:47 PM
Wednesday	7/15/2026	12:01 AM	7.98	7:08 AM	-2.02	5:58 AM	8:46 PM
Tuesday	8/11/2026	11:03 PM	7.74	5:19 AM	-1.4	6:23 AM	8:19 PM
Tuesday	10/27/2026	12:20 PM	7.83	(7:22 PM)	(-1.36)	7:41 AM	6:18 PM

Wednesday	10/28/2026	1:00 PM	7.83	(8:10 PM)	(-1.39)	7:42 AM	6:17 PM
Monday	11/23/2026	9:30 AM	7.89	(4:37 PM)	(-1.23)	7:13 AM	4:52 PM
Tuesday	11/24/2026	10:11 AM	8.18	5:22 PM	-1.69	7:14 AM	4:52 PM
Wednesday	11/25/2026	10:55 AM	8.30	6:10 PM	-1.88	7:15 AM	4:51 PM
Thursday	11/26/2026	11:43 AM	8.21	6:59 PM	-1.83	7:16 AM	4:51 PM
Friday	11/27/2026	12:34 PM	7.90	7:51 PM	-1.55	7:17 AM	4:50 PM
Monday	12/21/2026	8:12 AM	7.85	(3:35 PM)	(-0.80)	7:37 AM	4:52 PM
Tuesday	12/22/2026	9:01 AM	8.21	4:23 PM	-1.42	7:38 AM	4:52 PM
Wednesday	12/23/2026	9:52 AM	8.47	5:11 PM	-1.82	7:38 AM	4:53 PM
Thursday	12/24/2026	10:43 AM	8.55	5:59 PM	-1.97	7:38 AM	4:53 PM
Friday	12/25/2026	11:35 AM	8.41	6:46 PM	-1.86	7:39 AM	4:54 PM
Saturday	12/26/2026	12:28 PM	8.02	7:33 PM	-1.50	7:39 AM	4:55 PM

Attachment 2 – SWAMP Field Data Sheet

SWAMP Field Data Sheet (Water Chemistry & Discrete Probe) - EventType = WQ										Protocol: MPSSL-DFG_Field_v1.1		Agency: RWB1		Project Code : RWB1_																	
Sta Code:				Date (mm/dd/yyyy)		Sample Time:		Personnel:				Entered in d-base (initial/date)																			
Sta Name:																															
Habitat (Method = Habitat_Generic)			Purpose:		WaterChem		Habitat	FieldMeasure	Algae	WaterTox	SedChem	SedTox	TimeSeries																		
Site Descriptor:				WADEABILITY:		LOCATION:		Bank		Midchannel		DGPS		Lat (dd.dddddd)		Long (ddd.dddddd)															
				Y N Unk		GPS Device:		Accuracy (ft):		Datum:		Target:				-															
										WGS84		*Actual:				-															
				COLOR WATER		Colorless		Green		Gray		Brown		Yellow		Red		Black		Mixed											
DOM. SUBSTRATE:		Bedrock		Cobble		Gravel		Sand		Mud		Unknown		Other		OCCUPATION METHOD:		Walk In													
EVIDENCE OF FIRES:		No												STARTING BANK: (facing downstream)		LB		RB		NA											
OBSERVED FLOW:		Dry Waterbody Bed		No Obs Flow		Isolated Pool		Trickle (<0.1cfs)		0.1-1cfs		1-5cfs		5-20cfs		20-50cfs		50-200cfs		>200cfs											
ODOR Habitat :		None		Sulfides		Sewage		Petroleum		Smoke		Other		HYDROMODIFICATION:		None		Bridge		Pipes		Channel		GradeControl		Culvert		Dam		Other	
ODOR Water:		None		Sulfides		Sewage		Petroleum		Smoke		Other		HYDROMOD LOCATION:		US		DS		WI		NA		PHOTOS - YES / NO							
OTHER PRESENCE:		None		Vascular		Nonvascular		OilySheen		Foam		Trash		Other		STREAM		WIDTH (m):												(RB)	
24 hr OVERLAND RUNOFF:		None		Light Precip		Moderate/Heavy		Unknown		DISTANCE FROM		BANK (m):				Duplicate?		YES		NO		FIELDQA									
PRECIPITATION:		None		Fog		Drizzle		Rain		Snow		WATER		DEPTH (m):				COLLECTION DEVICE:		SAMPLE TYPE											
24 hr PRECIPITATION:		None		Unknown		<1"		>1"								Individual bottle		by hand		GRAB											
SKY CODE:		Clear		Partly Cloudy		Overcast		Fog		Smoky		Hazy																			
WATER CLARITY:		Clear (see bottom)		Cloudy (>4" vis)		Murky (<4" vis)																									
Lab (Method = Water_Grab)																															
Depth: 0.1m		Position in Column																		YSI DataSonde:		EXO-									
														S/N:																	
Replicate 1		subsurface																		Calibration Date:											
Replicate 2		subsurface																		Calibration Sheet #:											
Field Results (Method = Field)																															
Depth: 0.1 m		Position in Column		Velocity Observed (fps)		Water Temp (°C)		Sp. Cond (uS/cm)		Salinity (ppt)		O2 (%)		O2 (mg/L)		pH		pH (mV)		Turbid (NTU)		Analysis Date/Time:									
Replicate 1		subsurface																													
Replicate 2		subsurface																		Barometric Pressure		Calibrated Pressure									
COMMENTS:																															
Rev. 09/04/2025																															

Attachment 3 – Field Checklist

Trip Planning

- ☐ Exchange contact information with field team
- ☐ Reserve a [fleet vehicle](#)
- ☐ Reserve room for [lodging](#) for night prior to sampling day
- ☐ Complete [Excess Lodging Form](#) (STD 255C), if applicable
- ☐ Complete [Trip Plan](#) (SWRCB 145) and submit to supervisor
- ☐ Print Little River at Crannell Road Salinity Study Monitoring Plan

Personal Gear

- ☐ Waders & boots
- ☐ Hand sanitizer
- ☐ Drinking water
- ☐ Rain jacket and/or rain pants, if applicable
- ☐ Snacks, optional
- ☐ Sunscreen, optional
- ☐ Hat, optional
- ☐ Headlamp

Field Monitoring

- ☐ Field Sheet
- ☐ Clipboard
- ☐ Ballpoint pen
- ☐ Multiparameter sonde
- ☐ Camera

Sample Collection

- ☐ Nitrile gloves (1 pair per person)
- ☐ Nitrile glove trash bag