
North Coast Regional Water Quality Control Board

TO: File: Russian River; Pathogen TMDL Development and Planning

FROM: Steve Butkus

DATE: July 25, 2013

SUBJECT: EVALUATION OF FECAL COLIFORM BACTERIA CONCENTRATIONS
MEASURED IN THE RUSSIAN RIVER WATERSHED

The North Coast Regional Water Board staff are developing Russian River Total Maximum Daily Loads (TMDLs) for pathogen indicators to identify and control contamination impairing recreational water uses. Potential pathogen contamination has been identified in the lower and middle Russian River watershed leading to the placement of waters within these areas on the federal Clean Water Act Section 303(d) list of impaired waters. The contamination identified has been linked to impairment of the contact recreation (REC-1) and non-contact recreation (REC-2) designated beneficial uses. Health advisories for these waters have been published and posted by Sonoma County and the City of Santa Rosa authorities.

Regional and State Water Board staff have used fecal indicator bacteria (FIB) concentrations to assess the support of the REC-1 beneficial use. Criteria exist for various FIB concentrations that indicate a potential health risk from exposure to pathogens in recreational waters. The bacteria do not pose a health risk, but are easier to measure than the actual pathogens that may pose a risk of illness. Fecal coliform bacteria were used as the indicator for risk to support recreational beneficial uses until 2001. Fecal coliform bacteria concentration was measured using the multiple tube fermentation analysis method (Standard Method 9221).

The North Coast Water Quality Control Plan (Basin Plan) promulgates both narrative and numeric criteria (i.e. Water Quality Objectives (WQO)) for bacteria concentrations that are protective of the REC-1 beneficial use.

The Basin Plan narrative Water Quality Objective states:

“The bacteriological quality of waters of the North Coast Region shall not be degraded beyond natural background levels.”

The Basin Plan numeric Water Quality Objective states:

"In no case shall coliform concentrations in waters of the North Coast Region exceed the following: In waters designated for contact recreation (REC-1), the median fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed 50/100 ml, nor shall more than ten percent of total samples during any 30-day period exceed 400/100 ml."

Standard Method 9221-E was used to analyze the water samples for fecal coliform concentration. The method applies the multiple-tube fermentation technique. These measurements are expressed as a Most Probable Number per 100 milliliter sample (MPN/100 mL).

Measured fecal coliform bacteria concentrations were used to assess whether the water body is supporting recreational (i.e., REC-1) beneficial use. North Coast Regional Water Board staff have collected water samples to measure fecal coliform bacteria concentrations at several beaches and streams in the Russian River watershed since 1980. Measured fecal coliform bacteria concentrations were compiled from four (4) recreation beaches on the Russian River (i.e., Camp Rose Beach Healdsburg Memorial Beach Johnsons Beach Monte Rio Beach) and one tributary stream along a public park (i.e., Santa Rosa Creek at Railroad Street along the Prince Memorial Greenway)

Measured fecal coliform bacteria concentrations were compiled and compared to the numeric Basin Plan WQOs. Table 1 shows the number of samples collected for each period and location available for assessment. Only 15 percent of the 30-day periods have adequate fecal coliform concentrations measurements for application of the two-part Basin Plan Water Quality Objective (i.e., median and 90th percentile from a 30-day period). Water samples were simply not collected frequently enough to provide a complete assessment of impairment to REC-1 using the Basin Plan WQO. For example, adequate water samples were not collected in Santa Rosa Creek to assess impairment with the Basin Plan WQO.

Table 1. Fecal coliform bacteria concentration sample sizes available for assessment with Basin Plan Water Quality Objective. Discrete 30-day periods were defined based on the Julian date of each year (i.e., 30-day period 1 for Julian days 1-30; 30-day period 2 for Julian days 31-60, etc.). **Blue** font indicates periods with an adequate sample size ($n \geq 5$) for REC-1 beneficial use assessment.

Location	Year	30-day Period							
		4	5	6	7	8	9	10	11
Camp Rose Beach	1995	1	5	4	3	4	2	0	0
	1997	0	1	4	5	4	1	0	0
	1998	0	0	4	5	4	1	0	0
	1999	0	0	6	4	4	1	0	0
	2000	0	0	3	4	3	2	0	0
	2001	0	0	4	4	5	1	0	0
	2001	0	0	1	0	0	0	0	0
	2005	0	0	0	0	1	0	0	0
Healdsburg Memorial Beach	1980	0	0	0	1	0	0	0	0
	1986	0	0	0	0	0	0	0	1
	1987	0	2	4	1	4	1	0	0
	1988	0	0	1	0	0	0	0	0
	1989	0	0	1	0	1	1	0	0
	1992	0	0	0	3	4	0	1	0
	1993	0	0	0	3	4	1	0	0
	1994	0	0	0	8	9	3	0	0
	1995	1	5	4	4	4	2	0	0
	1997	0	1	4	5	4	1	0	0
	1998	0	0	4	4	4	1	0	0
	1999	0	0	5	4	4	1	0	0
	2000	0	2	4	4	2	0	0	0
	2001	0	4	4	0	5	1	0	0
	2002	0	0	1	0	0	0	0	0
Johnsons Beach	1995	0	0	7	4	4	1	0	0
	1997	0	1	4	5	4	1	0	0
	1998	0	0	4	5	4	1	0	0
	1999	0	0	5	4	4	1	0	0
	2000	0	0	3	4	4	2	0	0
	2001	0	0	4	4	5	1	0	0
Monte Rio Beach	1997	0	1	4	5	4	1	0	0
	1998	0	0	4	5	4	1	0	0
	1999	0	0	5	4	4	1	0	0
	2000	0	0	3	4	4	2	0	0
	2001	0	0	4	4	5	1	0	0
	2002	0	0	1	0	0	0	0	0
Santa Rosa Creek at Railroad St.	2001	0	0	0	3	1	2	1	0
	2002	2	4	2	1	0	0	0	0

Table 2 shows the median and 90th percentile fecal coliform bacteria concentrations from the 32 periods with adequate sample sizes. Fecal coliform concentrations exceeded the water quality objective for at least one 30-day period, with 37 percent of all measurements exceeding the objective at all four beaches assessed prior to 2001. Fecal coliform bacteria concentration has not been measured in the Russian River watershed since 2001 due to the new analytical methods. Since 2001, new analytical methods approved by the U.S. Environmental Protection Agency have been used to measure *Escherichia coli* (*E. coli*) and *Enterococcus* bacteria concentrations in recreational waters

Table 2. Assessment of measured Fecal Coliform Bacteria Concentrations that Exceeded the Basin Plan Water Quality Objective for REC-1. **Blue** font indicates periods that exceed the objective.

Location	Year	30-day Period	Median Fecal coliform Concentration (MPN/100mL)	90th Percentile Fecal coliform Concentration (MPN/100mL)	Exceeds Water Quality Objective
Camp Rose Beach	1995	5	30	572	Yes
	1997	7	23	91	No
	1998	7	13	48	No
	1999	6	23	33	No
	2001	8	10	20	No
Healdsburg Memorial Beach	1994	7	99	151	Yes
	1994	8	140	167	Yes
	1995	6	82	148	Yes
	1997	7	49	74	No
	2001	8	110	130	Yes
Johnsons Beach	1995	6	120	158	Yes
	1997	7	46	50	No
	1998	7	50	76	No
	1999	6	33	157	No
	2001	8	50	230	No
Monte Rio Beach	1997	7	33	86	No
	1998	7	49	68	No
	1999	6	49	344	No
	2001	8	110	272	Yes

FINDINGS

- Fecal coliform bacteria concentrations measured at four beaches on the Russian River were assessed for REC-1 beneficial use support using the Basin Plan numeric criteria. Only 15% of the measurements were adequate to assess with two-part Water Quality Objective. Based on those available data, all four beaches assessed showed at least one 30-day period that exceeded the water quality objective, with 37% of the measurements overall exceeding the Water Quality Objective.