Watershed: American River – Lower American River

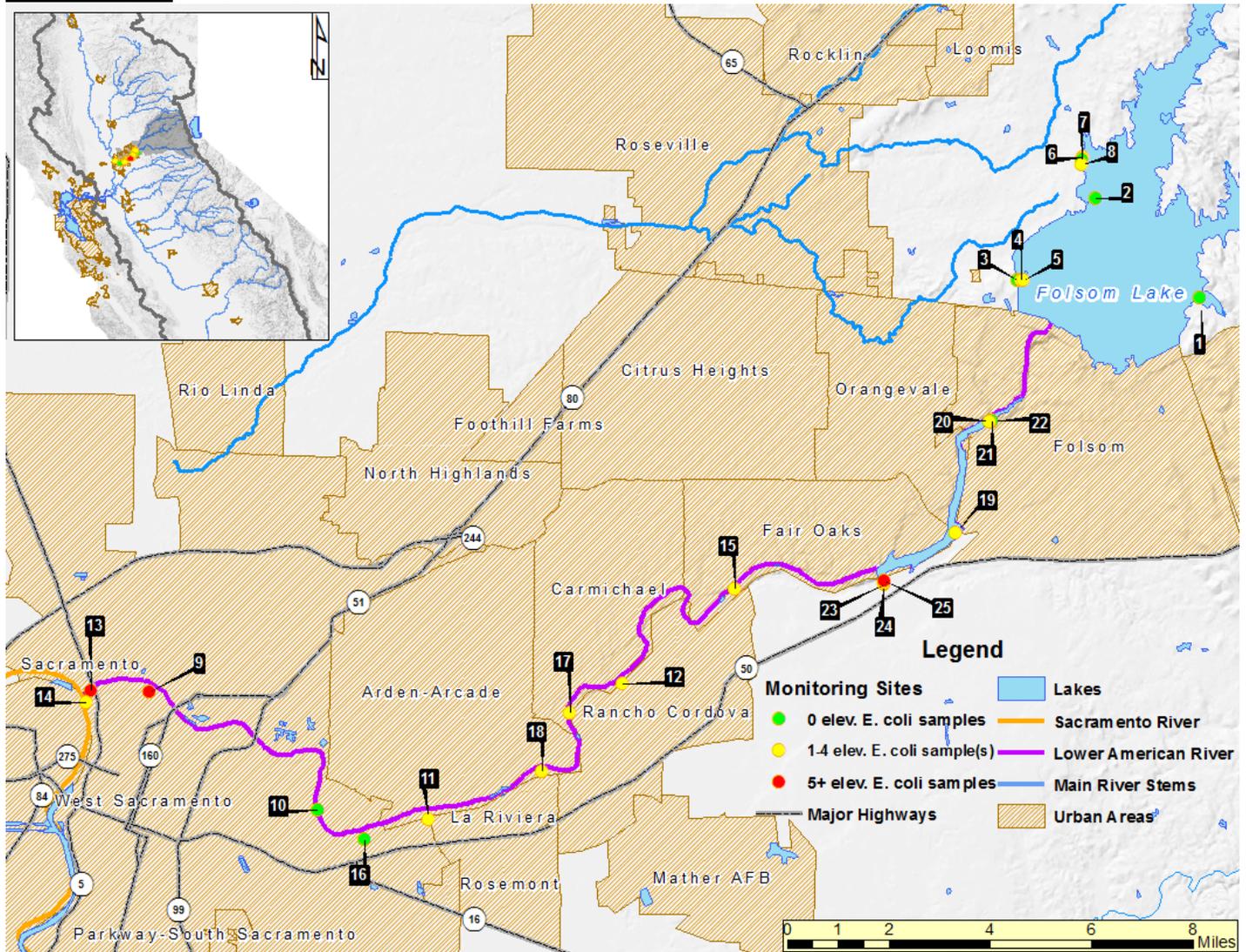**Years Sampled:** 2007-2014

Study Objectives:
1. Is there any evidence that beneficial uses are being impacted, and if so, what are potential contributors?
2. Are there any noticeable regional, seasonal or trends observed in the water quality data?
3. What are pathogen concentrations at selected monitoring sites?

KEY STATISTICS

Number of sites sampled	**25**
Sampled by	**Water Board Staff (Sac)**
Number of sites sampled for pathogens	**20**
Number of total samples	**655**
Sampling Frequency	**2x/mo. (May-Sept.)**
Assessment Threshold	**320 MPN/100 mL**

Message: **Seventeen sites have had one or more samples with elevated *E.coli* and seven sites have tested positive for pathogens. Eight sites never exceeded the assessment threshold.**

Site Locations:

Legend

Monitoring Sites
- 🟢 0 elev. E. coli samples
- 🟡 1-4 elev. E. coli sample(s)
- 🔴 5+ elev. E. coli samples
- Major Highways

- Lakes
- Sacramento River
- Lower American River
- Main River Stems
- Urban Areas

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Summary of Results:

Table 1: Field Measurements

Station Code	Map #	Station Name	Oxygen, Dissolved (mg/L)		pH		SpConductivity (uS/cm)		Temperatiure (°C)		Turbidity (NTU)	
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
514ELD010	1	Folsom Lake at Browns Ravine	5.55	10.59	7.57	8.90	40.0	69.8	21.72	28.97	1.09	34.10
514PLA105	2	Folsom Lake at Granite Bay Boat Ramp	8.47	9.47	7.85	8.57	7.0	70.2	23.35	27.13	1.58	23.50
514PLABPL	3	Folsom Lake at Beal's Point-Left	5.95	9.83	7.63	8.21	39.0	88.0	20.67	28.73	1.72	18.90
514PLABPM	4	Folsom Lake at Beal's Point-Middle	6.09	10.10	7.67	8.32	54.0	98.0	22.83	30.01	1.57	125.00
514PLABPR	5	Folsom Lake at Beal's Point-Right	6.45	9.81	7.72	8.37	38.0	97.0	22.06	29.13	1.32	37.10
514PLAGBL	6	Folsom Lake at Granite Bay-Left	5.72	11.37	7.55	8.31	53.0	102.0	23.20	30.17	3.17	95.20
514PLAGBM	7	Folsom Lake at Granite Bay-Middle	5.91	11.60	7.54	8.59	58.0	97.0	20.10	30.74	2.72	122.00
514PLAGBR	8	Folsom Lake at Granite Bay-Right	5.75	11.80	7.50	8.64	56.0	97.0	22.49	30.72	3.27	161.00
514SAC009	9	AR at North 10th Street	8.01	14.48	6.99	8.54	31.0	155.0	11.65	21.73	0.77	37.10
514SAC010	10	AR at H Street/Fair Oaks	10.19	10.19	8.10	8.10	52.0	52.0	16.35	16.35	1.39	1.98
514SAC011	11	AR at Watt Ave Bridge	7.02	13.13	4.42	8.00	43.0	240.0	12.07	21.28	0.55	5.52
514SAC012	12	AR at Hagan Community Park	6.63	17.81	6.97	8.17	41.0	148.0	11.70	19.55	0.79	4.59
519AMNDVY	13	AR at Discovery Park	8.24	15.11	6.94	9.55	38.0	386.5	11.43	22.83	0.67	24.40
519AMNSAC	14	American/Sacramento River Confluence Beach	7.85	9.66	7.10	7.80	45.0	161.9	17.06	22.73	1.77	15.00
519LSAC52	15	AR at Lower Sunrise Area	6.80	14.90	6.68	8.81	37.0	157.0	10.81	24.33	0.61	12.60
519LSAC53	16	AR at Howe Ave Access	7.02	9.79	7.04	7.50	43.2	75.6	16.49	20.35	0.68	3.75
519SAC102	17	AR at River Bend Park	6.97	15.72	6.91	8.52	36.0	146.0	11.77	21.28	0.56	35.60
519SAC103	18	AR at Harrington Street	6.25	13.22	6.85	8.04	33.0	158.0	11.73	20.89	0.74	14.30
519SAC130	19	Lake Natoma at Willow Creek	6.57	13.91	7.07	8.47	57.9	250.0	19.14	27.04	0.92	8.93
519SACFCL	20	Lake Natoma at Folsom Crossing-Left	8.72	10.36	7.17	7.40	58.0	106.0	16.53	20.08	0.82	6.50
519SACFCM	21	Lake Natoma at Folsom Crossing-Middle	9.20	10.67	7.17	7.43	59.0	103.0	15.57	20.89	0.79	4.38
519SACFCR	22	Lake Natoma at Folsom Crossing-Right	6.37	11.12	7.09	7.49	37.0	61.0	16.57	21.66	1.29	6.64
519SACNFL	23	Lake Natoma at Nimbus Flat-Left	6.35	13.32	6.85	7.90	40.0	107.0	15.60	23.35	0.87	8.48
519SACNFM	24	Lake Natoma at Nimbus Flat-Middle	5.74	12.88	6.22	7.79	35.2	101.0	18.00	23.19	1.17	38.20
519SACNFR	25	Lake Natoma at Nimbus Flat-Right	6.73	15.40	6.86	8.97	39.0	102.0	18.16	23.73	1.34	32.40
AR: American River												

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Table 2: *E. coli* and Pathogen Results

Map #	*E. coli* (MPN/100ml)					*Cryptosporidium* (cysts/L)			*Giardia* (oocysts/L)			*Salmonella* (MPN/100mL)			*E.Coli* O157:H7 (Presence/Absence)		
	Mean	Min	Max	Count	>320	Max Result	Count	(+)	Max Result	Count	(+)	Max Result	Count	(+)	Result	Count	(+)
1	13.1	<1.0	129.6	21	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
2	33.4	<1.0	218.7	9	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
3	71.6	6.3	248.9	13	0	0.1	3	2	0.1	3	2	Not Detected	4	0	Not Detected	4	0
4	211.9	7.4	1732.9	10	1	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
5	163.7	1.0	866.4	11	2	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
6	173.3	2.0	1203.3	11	2	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
7	52.7	1.0	307.6	12	0	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
8	160.4	2.0	1119.9	11	1	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
9	348.7	8.4	2419.6	38	11	Not Detected	2	0	Not Detected	2	0	Not Detected	2	0	Not Detected	2	0
10	36.4	36.4	36.4	1	0	Not Detected	1	0	Not Detected	1	0	Not Detected	1	0	Not Detected	1	0
11	137.2	8.6	980.4	31	3	Not Detected	2	0	0.1	2	1	Not Detected	3	0	Not Detected	3	0
12	54.6	3.0	488.4	24	1	Not Detected	2	0	Not Detected	2	0	Not Detected	3	0	Not Detected	3	0
13	456.7	9.8	2419.6	56	18	0.3	9	5	1.1	9	6	2.2	9	3	Present	9	1
14	387.4	6.3	2419.6	19	4	NA	0	0	NA	0	0	NA	0	0	NA	0	0
15	40.5	2.0	579.4	50	1	Not Detected	2	0	Not Detected	2	0	2.2	2	0	Not Detected	2	0
16	60.2	22.1	146.7	10	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
17	57.2	4.1	686.7	41	1	Not Detected	1	0	Not Detected	1	0	Not Detected	1	0	Not Detected	1	0
18	68.5	5.2	1553.1	42	1	Not Detected	1	0	0.1	1	1	Not Detected	1	0	Not Detected	1	0
19	152.3	13.2	1732.9	21	1	NA	0	0	NA	0	0	NA	0	0	NA	0	0
20	129.6	4.1	307.6	4	0	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
21	69.9	13.4	105.0	4	0	NA	0	0	NA	0	0	Not Detected	1	0	Present	1	1
22	246.6	13.2	816.4	12	3	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
23	257.3	7.5	2419.6	25	4	1.2	4	3	0.1	4	2	0.1	5	3	Not Detected	5	0
24	292.9	12.2	2419.6	22	4	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0
25	218.8	12.1	770.1	21	5	NA	0	0	NA	0	0	Not Detected	1	0	Not Detected	1	0

E.coli - Highlighted Cells: Exceeds EPA Guidline of 320 MPN/100ml   Pathogens- (+): positive result, Highlighted Cells: positive results, NA: Not Applicable

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Graph 1: *E. Coli Results*
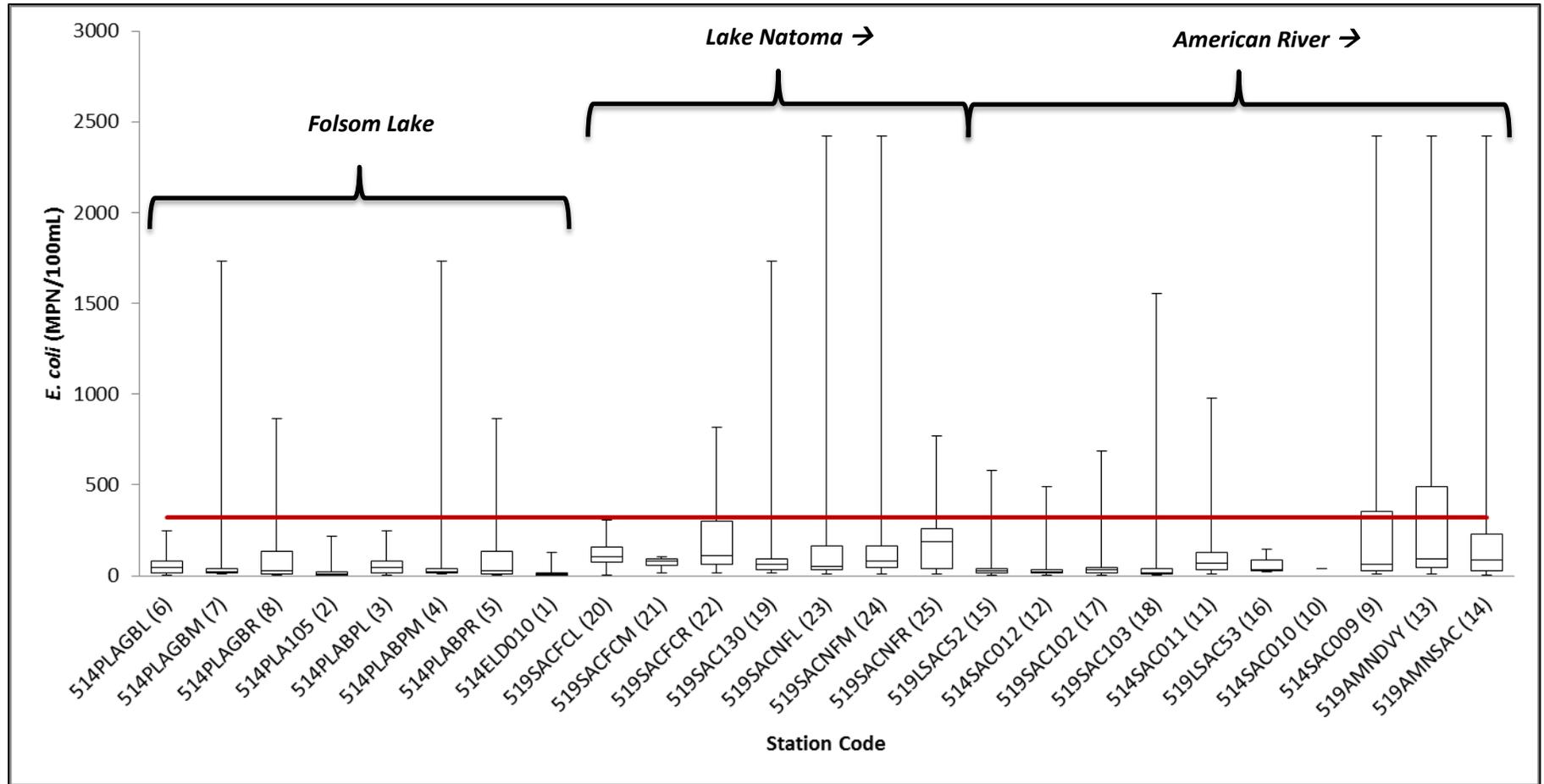
6,7,8,2,3,4,5,1 = shorelines along Folsom Lake; 20,21,22,19,23,24,25 = progressive DS flow along Lake Natoma;
15,12,17,18,11,16,10,9,13,14 = progressive DS flow along American River

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WHAT IS THE MEASURE SHOWING?

The Lower American River originates from Folsom Lake, which is located ~30 miles east of Sacramento. The lower portion of the American River travels from Folsom to Rancho Cordova and Sacramento, meeting with the Sacramento River northwest of downtown Sacramento. The left, middle and right locations of beaches (along Folsom Lake and Lake Natoma) were chosen in order to compensate for the size and popularity of the larger beach sites. Field measurements for each site are shown in Table 1.

Results show that 17 of the 25 sites exhibited elevated levels of *E. coli* in the Lower American sub watershed on one or more occasions (shown in Table 2). There were 63 samples with elevated levels out of 519 samples, or 12.1%. The highest concentration (>2419.6 MPN/100 mL) occurred at five different sites; two of the sites are located at and just upstream of the confluence with the Sacramento River in West Sacramento (13, 14), one is located less than two miles further upstream from the confluence near North 10th Street (9), and the other two sites are located at Nimbus Flat in the city of Folsom (23, 24). The three sites at and above the confluence also have average results above the recommended EPA guideline (320 MPN/100 mL). While there were detections at seventeen sites (shown in Graph 1), their occurrences were fewer relative to the sample count for sites between Lake Natoma and the Sacramento-American confluence. Detections at Folsom Lake were rarer as well.

The Lower American sub-watershed is primarily urban (Jin et al., 2013), and potential non-point sources are abundant. It is heavily utilized for recreational activities, and is home to numerous waterfowl throughout the year as well. In addition, the increasing drought may be a contributing factor for contamination as the waters become more concentrated. Further study is needed to identify specific sources.

Twenty sites in the Lower American River sub watershed were sampled for pathogenic *E. coli* O157:H7, *Cryptosporidium*, *Giardia*, and *Salmonella*. Seven of the sites tested positive for pathogens (shown in Table 2). There are currently no water quality objectives for these constituents.

WHY THIS INFORMATION IS IMPORTANT?

In 2012, the USEPA amended recreational water quality guidelines for human health under the Clean Water Act, specifying the standard threshold value (STV) for the indicator bacteria *E. coli* as 320 colony-forming units (CFU) per 100 milliliters (mL). The STV represents the 90% percentile of the water quality distribution, beyond which the water body is not recommended for recreation (Nappier & Tracy, 2012).

E. coli is an indicator of potential fecal contamination and risk of illness for those exposed to water (e.g. when swimming). Since *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern, the data collected from this study provide more information on pathogen indicators as well as specific water-borne pathogen concentrations to better assess their impact on the beneficial use of recreation and to identify potential contributors by sub watershed.

WHAT FACTORS INFLUENCE THE MEASURE?

E. coli and specific water-borne pathogens can come from human or animal waste and may be highly mobile and variable in flowing streams. In addition to human recreational use, the presence of pathogens in water may be the result of cattle grazing, wildlife, urban and agricultural runoff, or sewage spills. The physical condition of the watershed may also influence pathogen measurements, however in this study field measurements (temperature, SC, DO, turbidity and pH) were variable between sites and it is unclear if these constituents had an effect on the *E. coli* or pathogen measurements.

TECHNICAL CONSIDERATIONS:

- Data available at: CEDEN
- *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern.
- Public reports and fact sheets are available at:
  http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/swamp_regionwide_activities/index.shtml

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