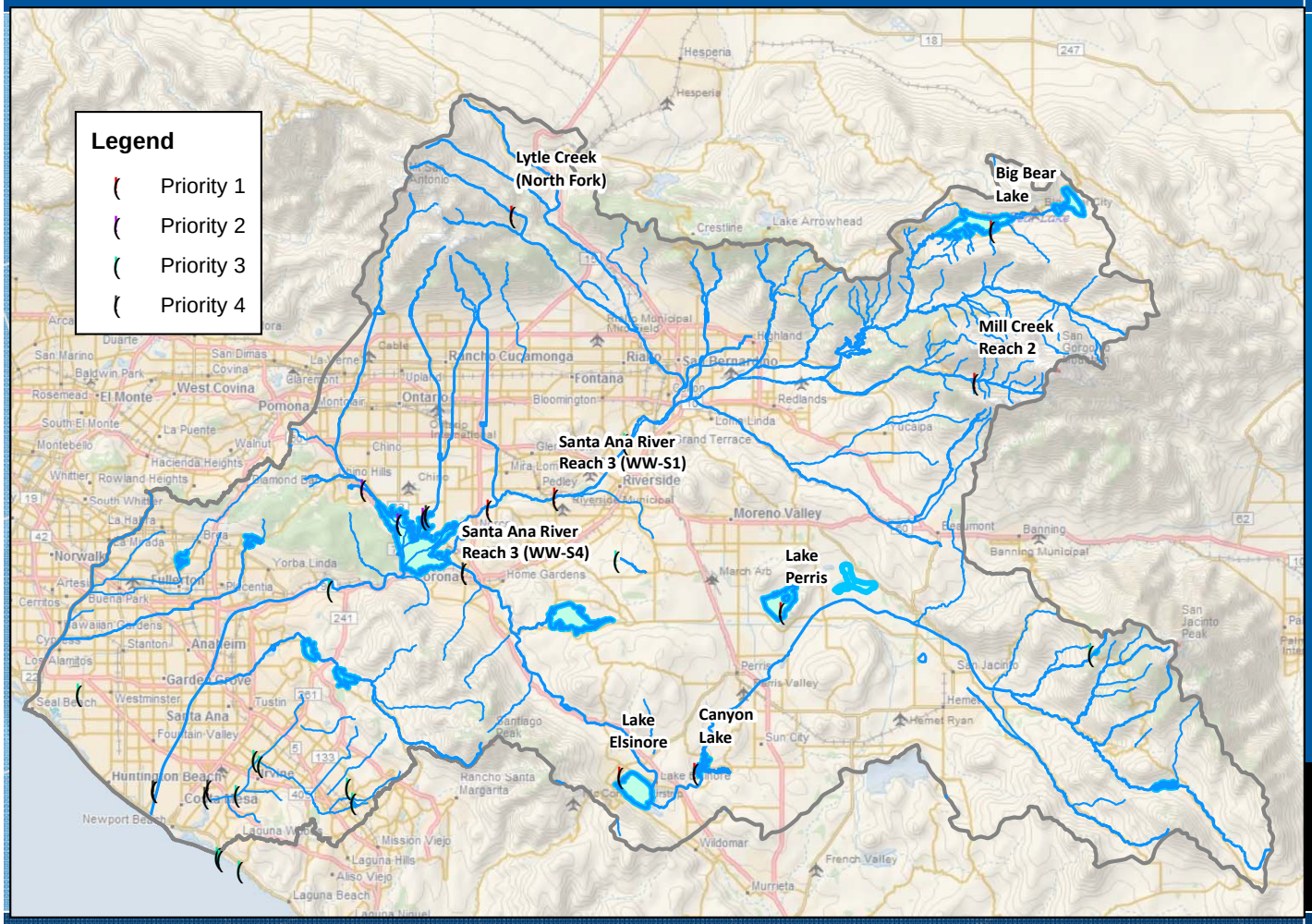
Regional Bacteria Monitoring Plan

Joint MSAR TMDL / Regional WQ Monitoring Task Force Meeting

April 17, 2018



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Presentation Outline

- RMP implementation
- Review of ambient bacteria conditions (P1-P4)
- Key findings

RMP Implementation

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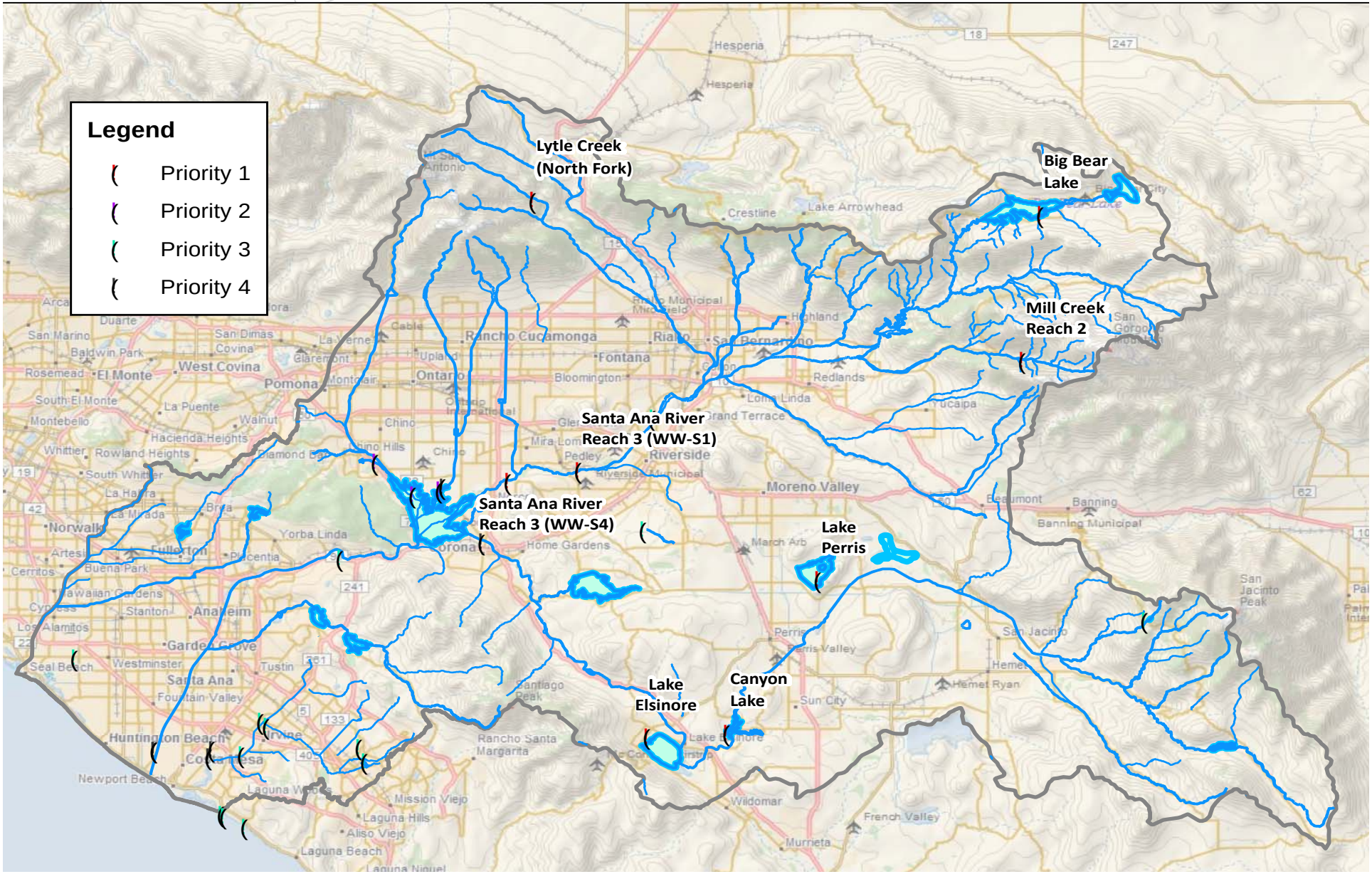
Sample Locations



Sample Collection

- 2017-2018 RMP sampling

Priority	Planned/Collected	Dry Weather	Wet Weather
Priority 1	Planned	200	0
	Collected	200	0
Priority 2	Planned	125	20
	Collected	107 [A]	20
Priority 3	Planned	65	0
	Collected	60 [B]	0
Priority 4	Planned	5	0
	Collected	10 [C]	0

Ambient Bacteria Conditions

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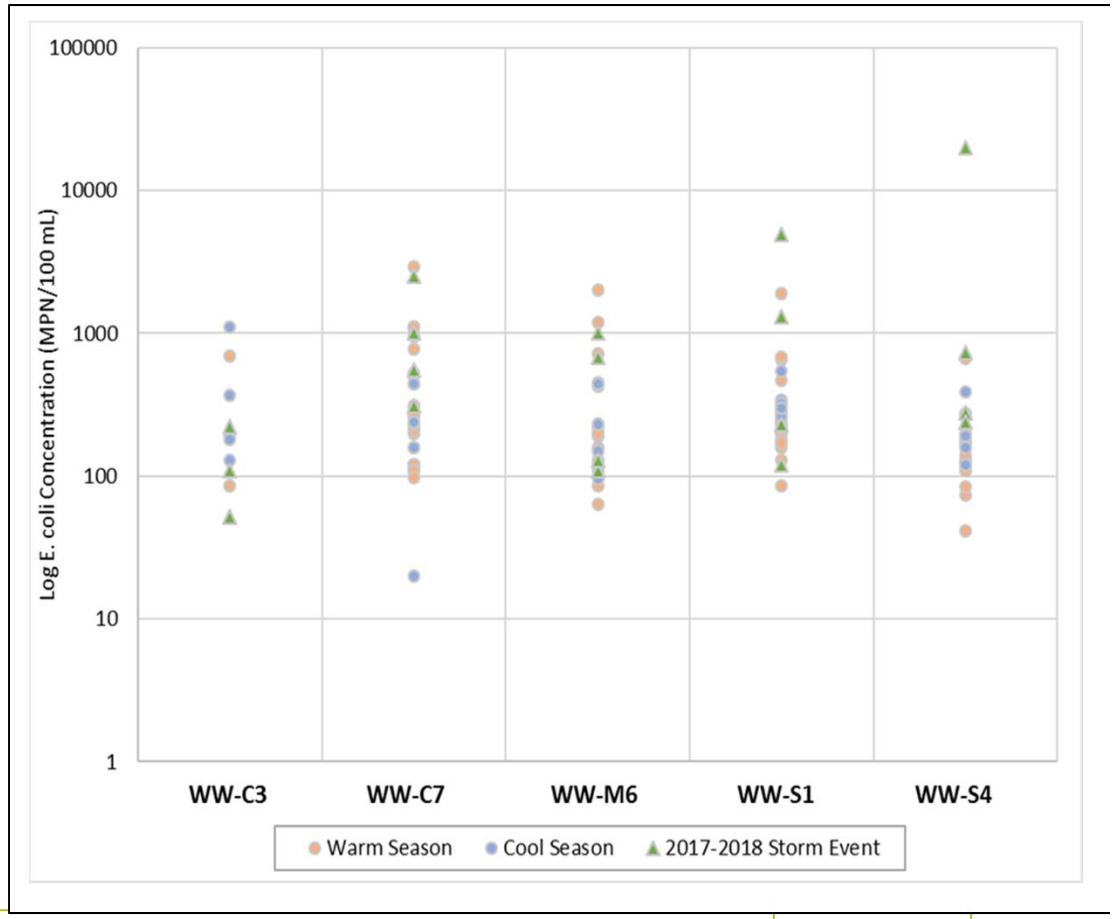
Priority 1 Sites – Frequent recreational use

- No impairment of recreational use at Priority 1 sites, except for Santa Ana River stations
- CBRP implementation to address SAR impairment

Site ID	Site	Geometric Mean Criterion Exceedance Frequency (%)
P1-1	Canyon Lake at Holiday Harbor	0
P1-2	Lake Elsinore	0
P1-3	Lake Perris	0
P1-4	Big Bear Lake at Swim Beach	0
P1-5	Mill Creek Reach 2	0
P1-6	Lytle Creek (Middle Fork)	0
WW-S1	Santa Ana River Reach 3 at MWD Crossing	100
WW-S4	Santa Ana River Reach 3 at Pedley Avenue	53

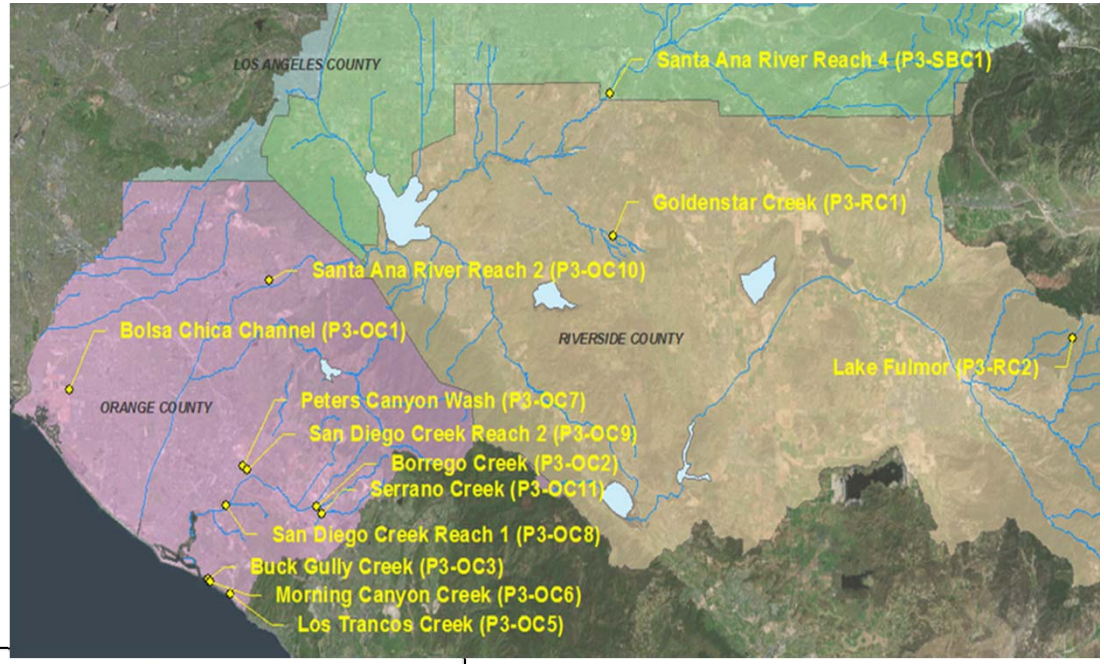
Priority 2 Sites – MSAR TMDL locations

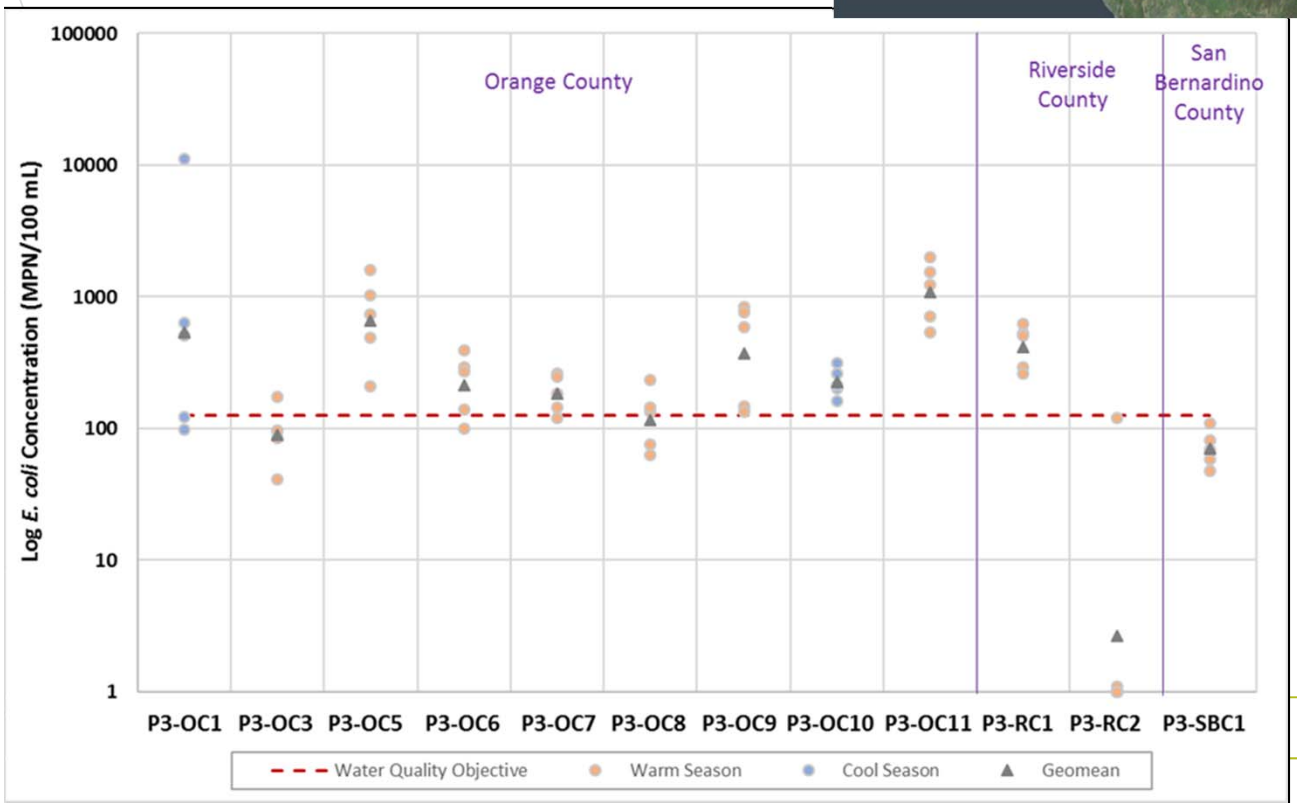
- Concentrations continue to exceed WQOs
- CBRP working to reduce MS4 sources
- Reduced dilution flow
- Several key projects constrained/delayed
- Natural source loads are important



Priority 3 Sites

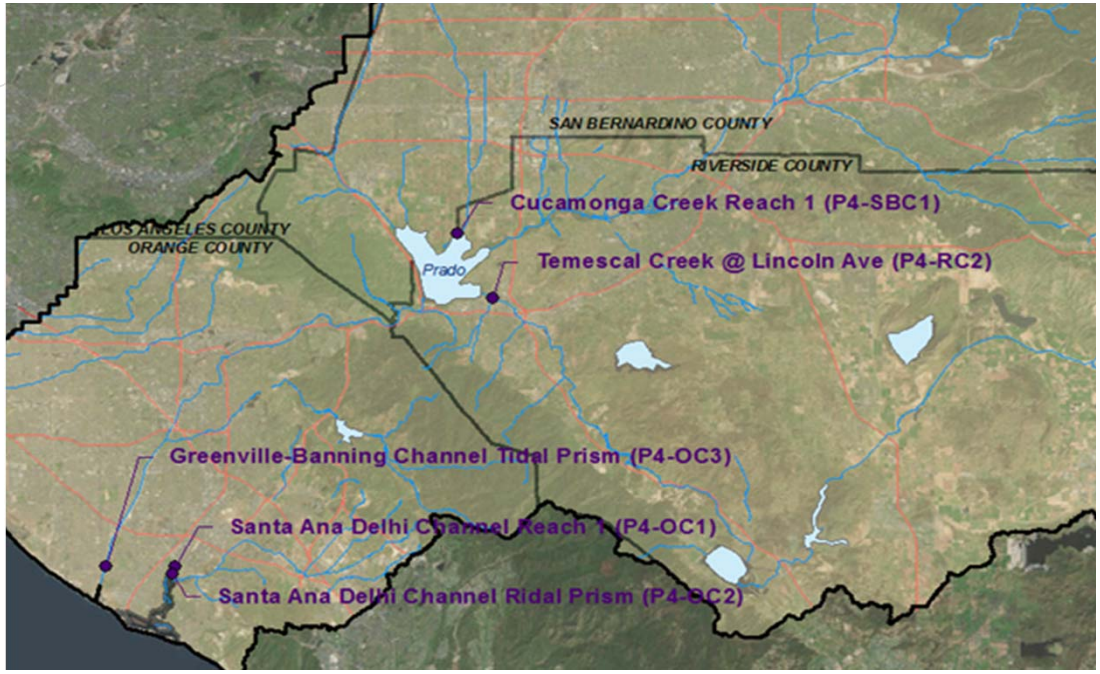
- Data to characterize bacteria in other subwatersheds





Priority 4 Sites

- 2017 - Cucamonga Creek exceedance
- Follow-up monitoring
- Anti-degradation target of 1385 MPN/100mL developed from historical (higher RP1 flows) conditions



Sample Requirement	Sample Date	*E. coli* Concentration (MPN/100 mL)
Original Annual Sample	6/22/2017	> 2400
Required Monthly Follow-up Samples	7/28/2017	2400
	8/31/2017	2000
	9/20/2017	390
	10/31/2017	1100
	11/30/2017	280

Key Findings

Priority 1 waters are supporting recreational use

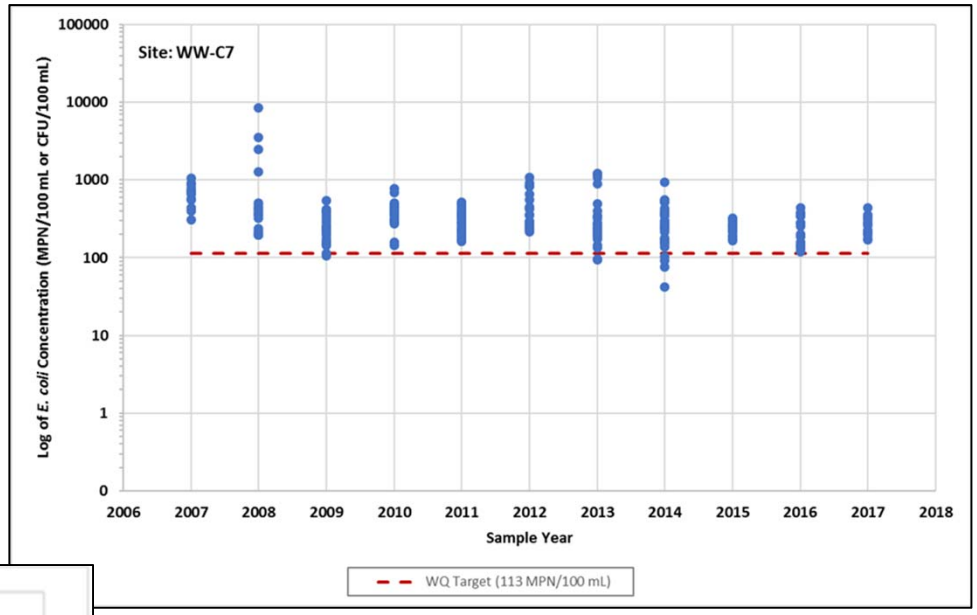
Big Bear Lake at Swim Beach monitoring site.

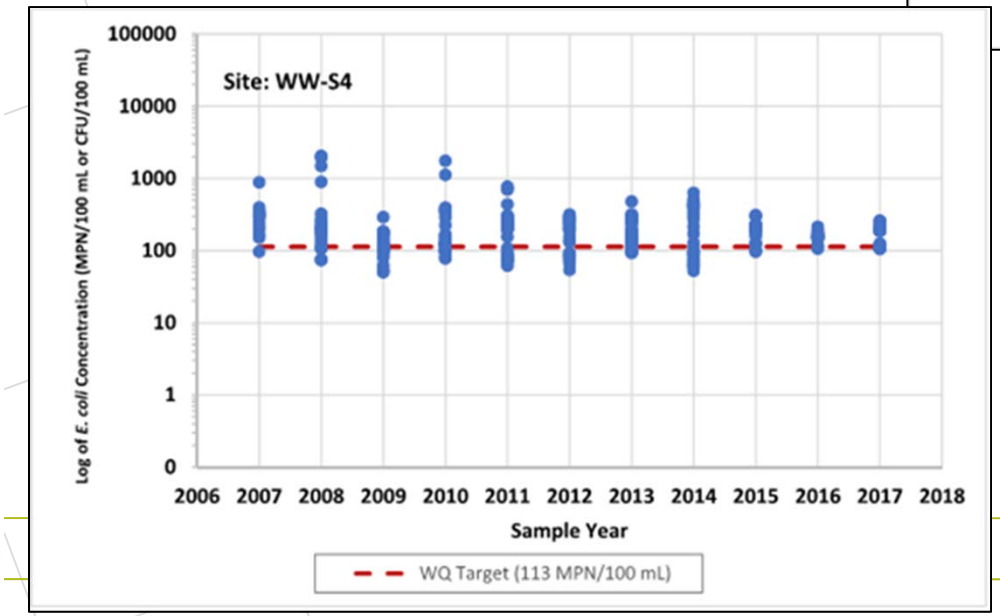
Canyon Lake

Aerial Close up of the dock at Lake Perris West Beach.

Priority 2 - MSAR Bacteria TMDL waters

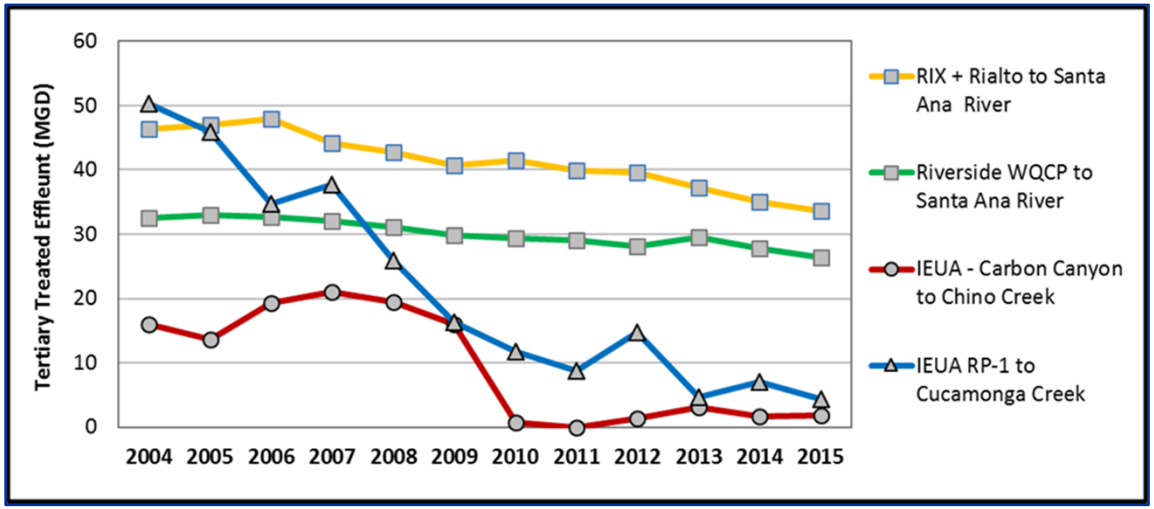
- Other factors have limited TMDL waters from achieving WQOs

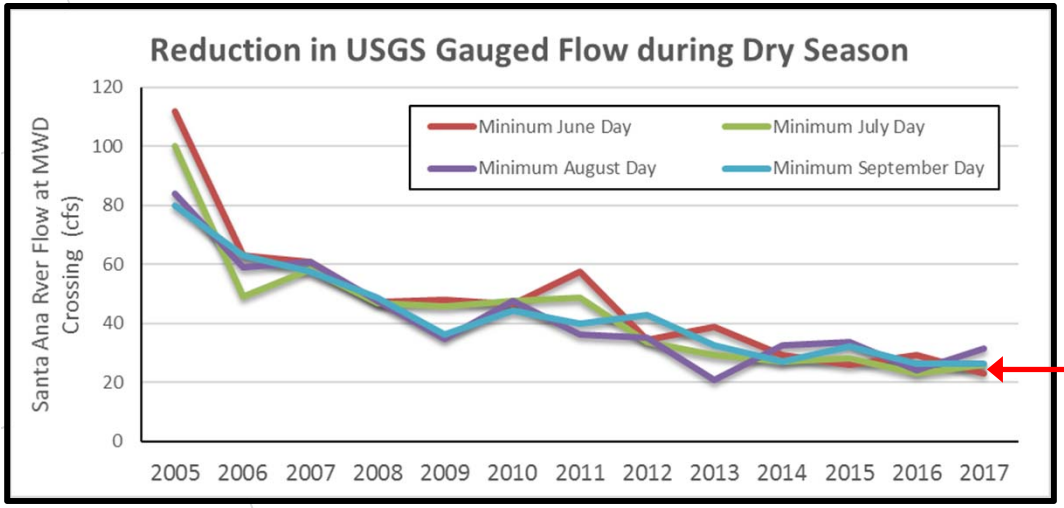


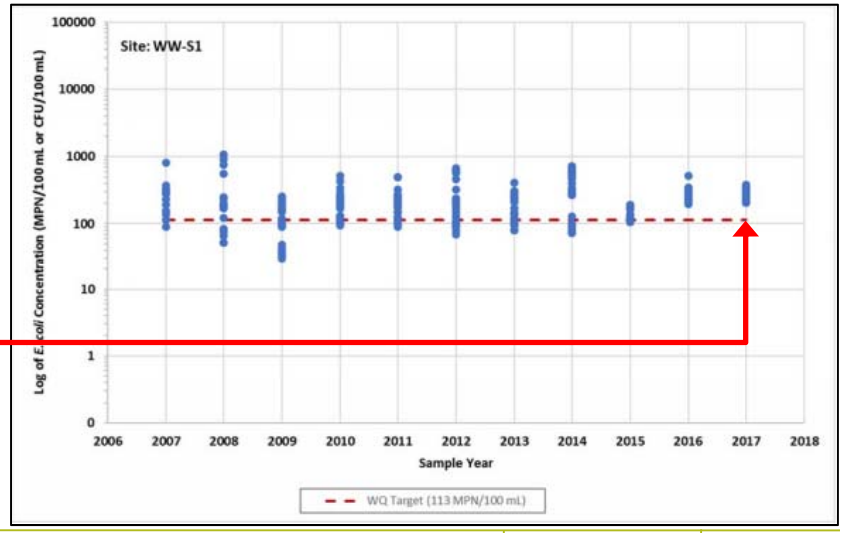


Priority 2 - MSAR Bacteria TMDL waters

- Reduction in dilution flows – 10 years

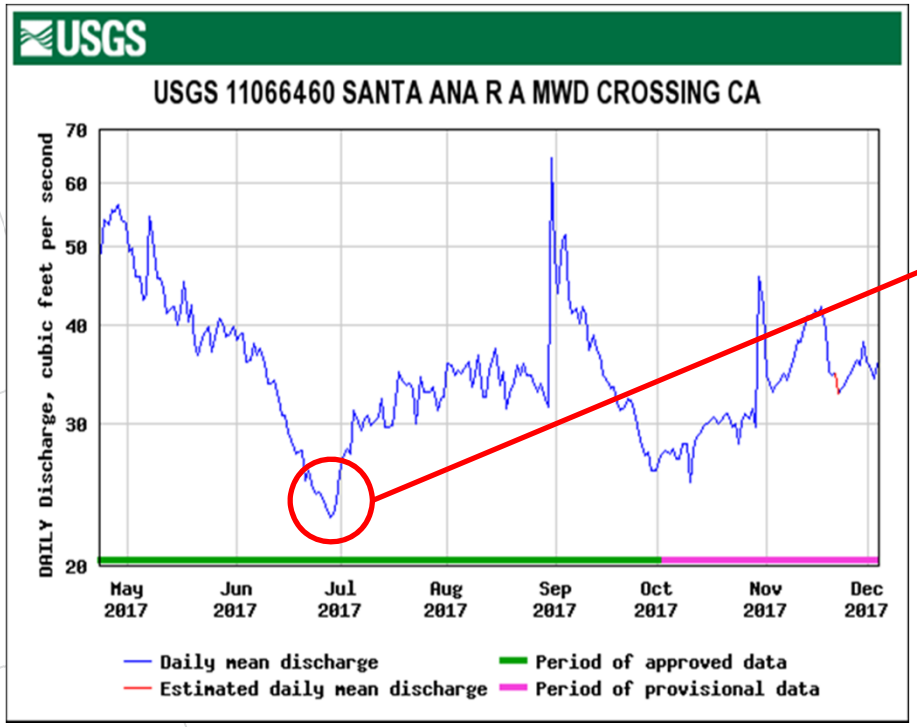


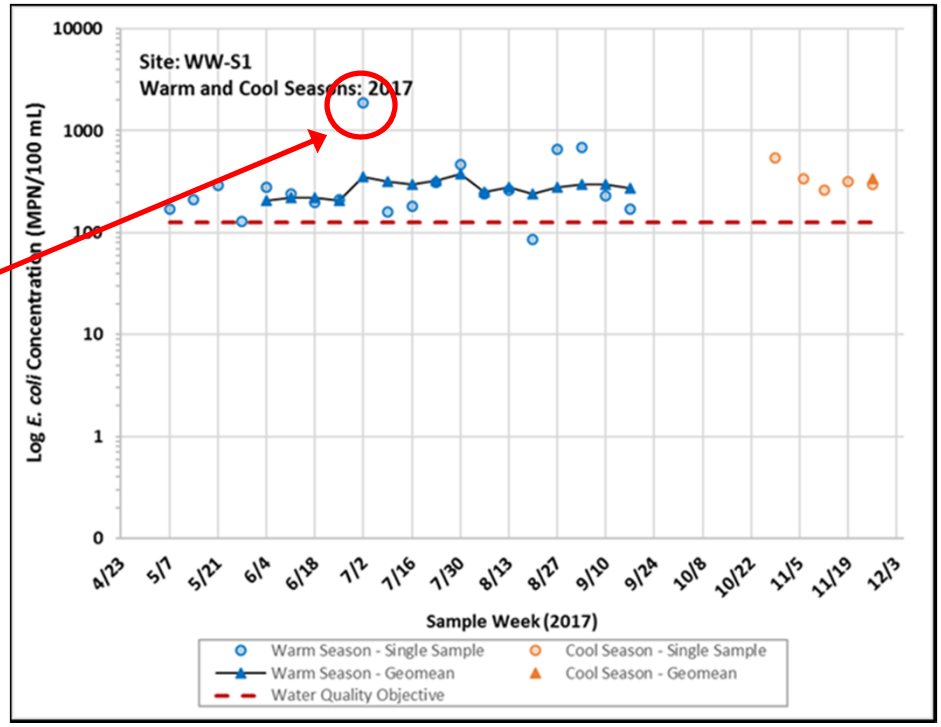




Priority 2 - MSAR Bacteria TMDL waters

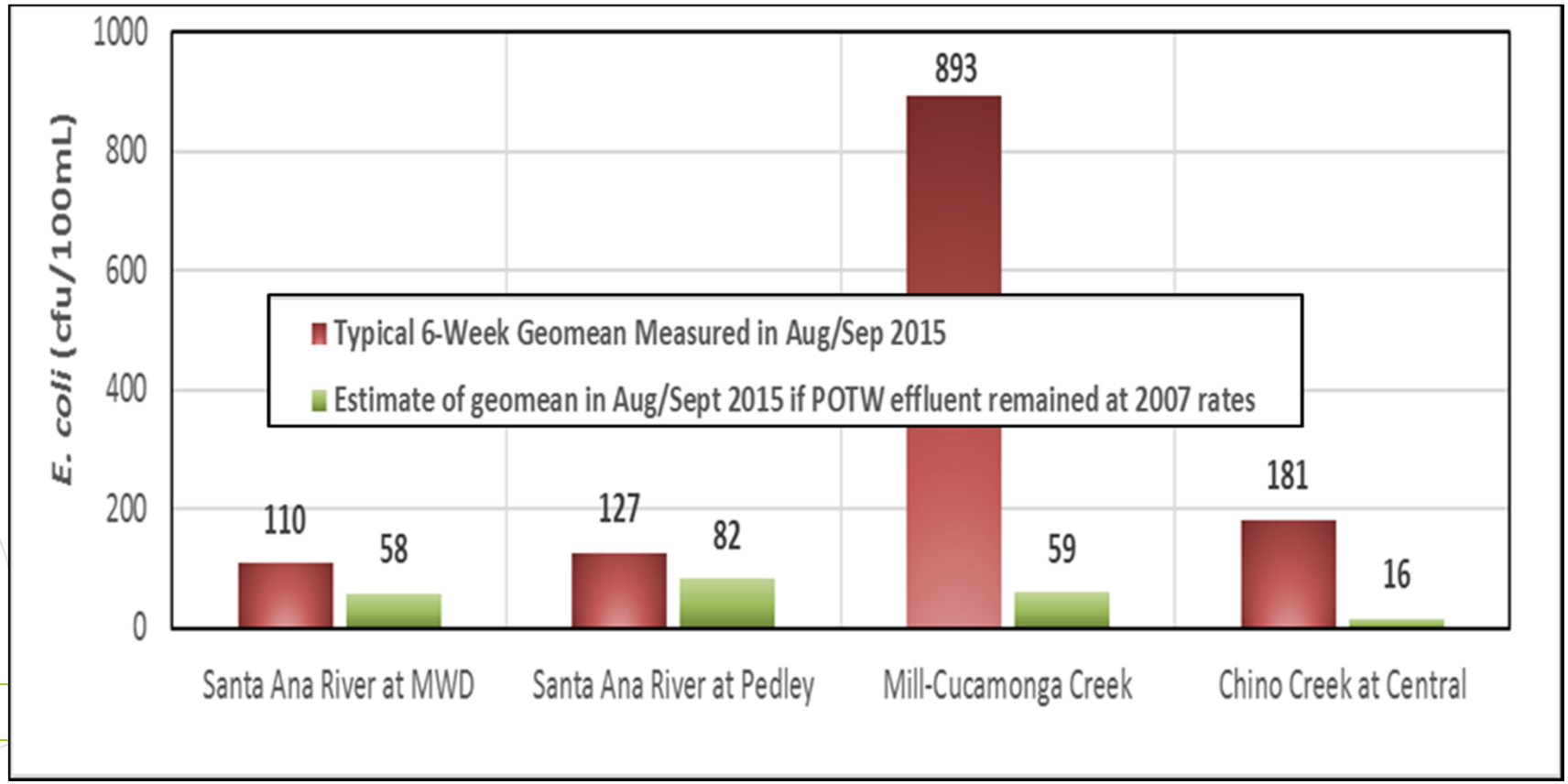
- Example for Santa Ana River at MWD Crossing





MSAR Bacteria TMDL waters

- MS4 bacteria reduction apparent in mass balance analysis
- What downstream E.coli would be expected with 2007 POTW effluent rates (shown in green bars)



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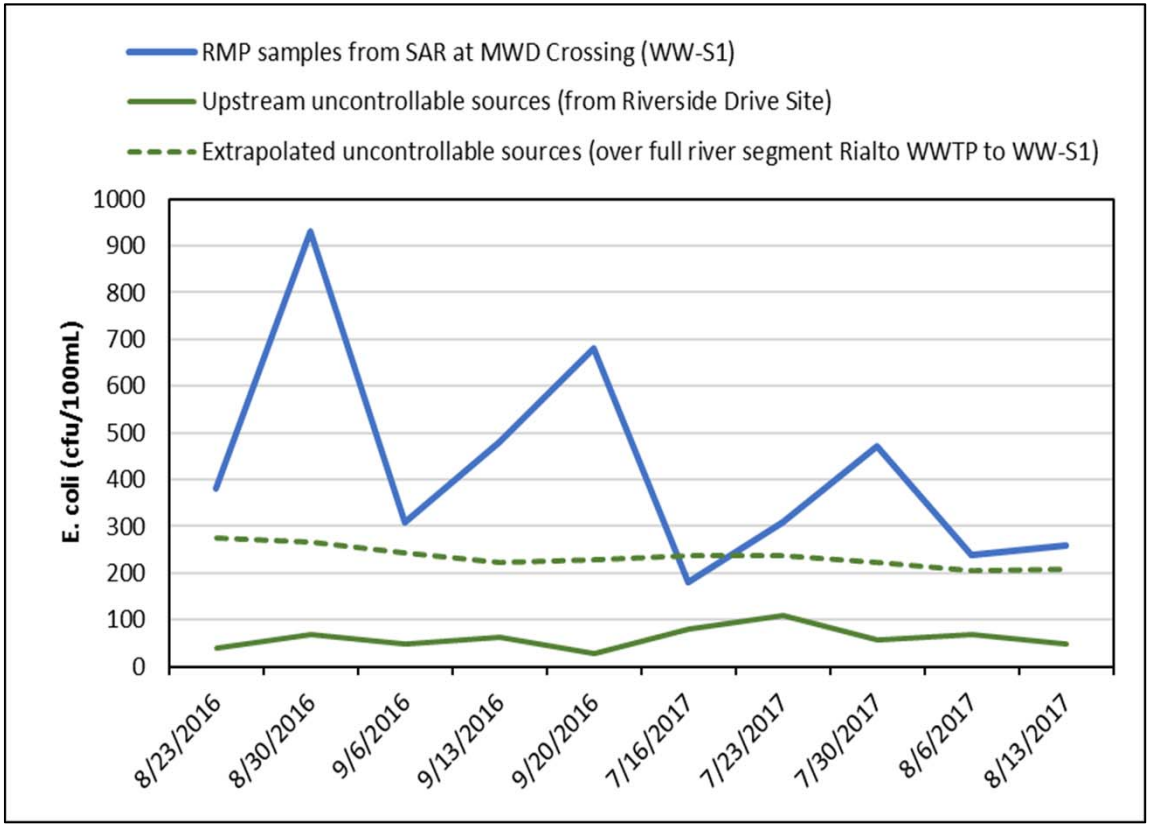
Estimate of Uncontrollable Bacteria Load

- Santa Ana River Reach 4 site downstream of RIX/Rialto effluent, no MS4 inflows upstream
- Natural 04 site from RCFC&WCD Uncontrollable Bacteria Source Study
- Distance traveled within SAR riparian area – 1.5 miles

Estimate of Uncontrollable Bacteria Load

- *E. coli* ranging from 15 – 110 cfu/100mL
- Mass of bacteria approximated at Riverside Ave site
- ~25 billion cfu/day/mile or ~2.5 lbs feces/day/mile



- Extrapolation of 1.5 mile segment to 8 miles between discharge and MWD Crossing WW-S1

Estimate of Uncontrollable Bacteria Load

- Prior study by UC Irvine researchers
- RWQCP effluent channel study suggests shearing of naturalized Enterococcus in sediment

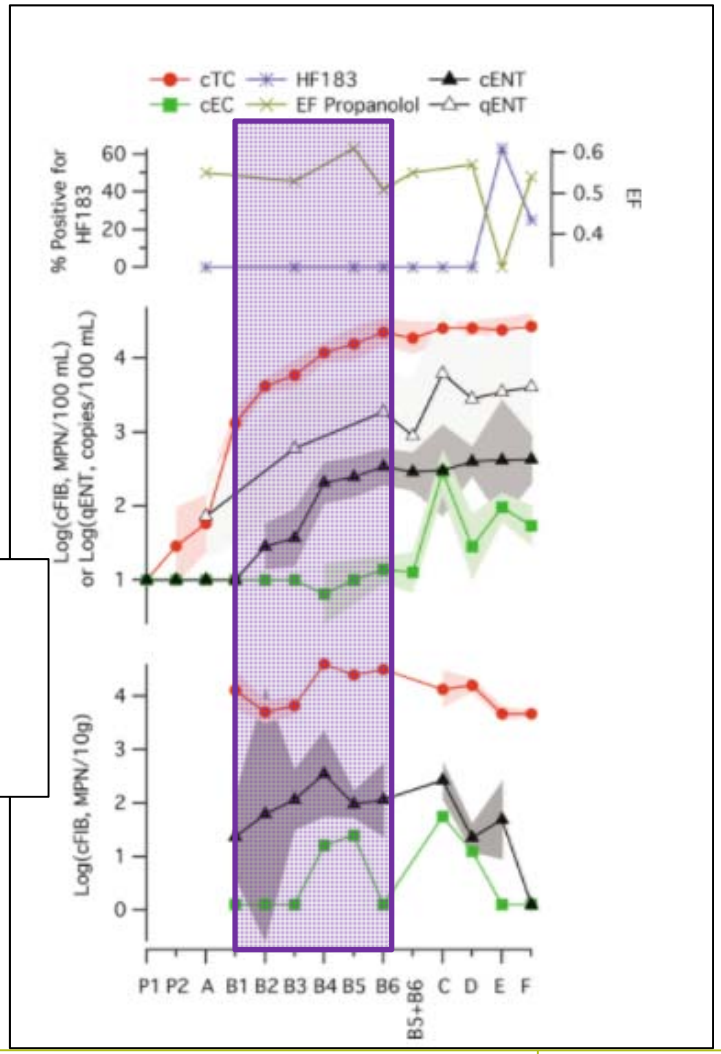


FIGURE 2. Averages and standard deviations of the fecal pollution markers measured during the field study. Top panel: Water column measurements of HF183 Bacteroides and EF of propranolol. Middle panel: Water column measurements of cTC, cEC, cENT, and qENT. Bottom panel: Sediment measurements of cTC, cEC, and cENT.

Figure from Litton, Rachel M., Jong Ho Ang, Bram Sercu, Patricia A. Holden, David L. Sedlak, and Stanley B. Grant. Evaluation of Chemical, Molecular, and Traditional Markers of Fecal Contamination in an Effluent Dominated Urban Stream. Environ.Sci.Technol.2007, 41, (13), 4515–4521.

Estimate of Uncontrollable Bacteria Load

- Speciation showed dominance of *E. casseliflavus* (common to decaying vegetation) over *E. faecalis* or *E. faecium* (common to humans and animals)

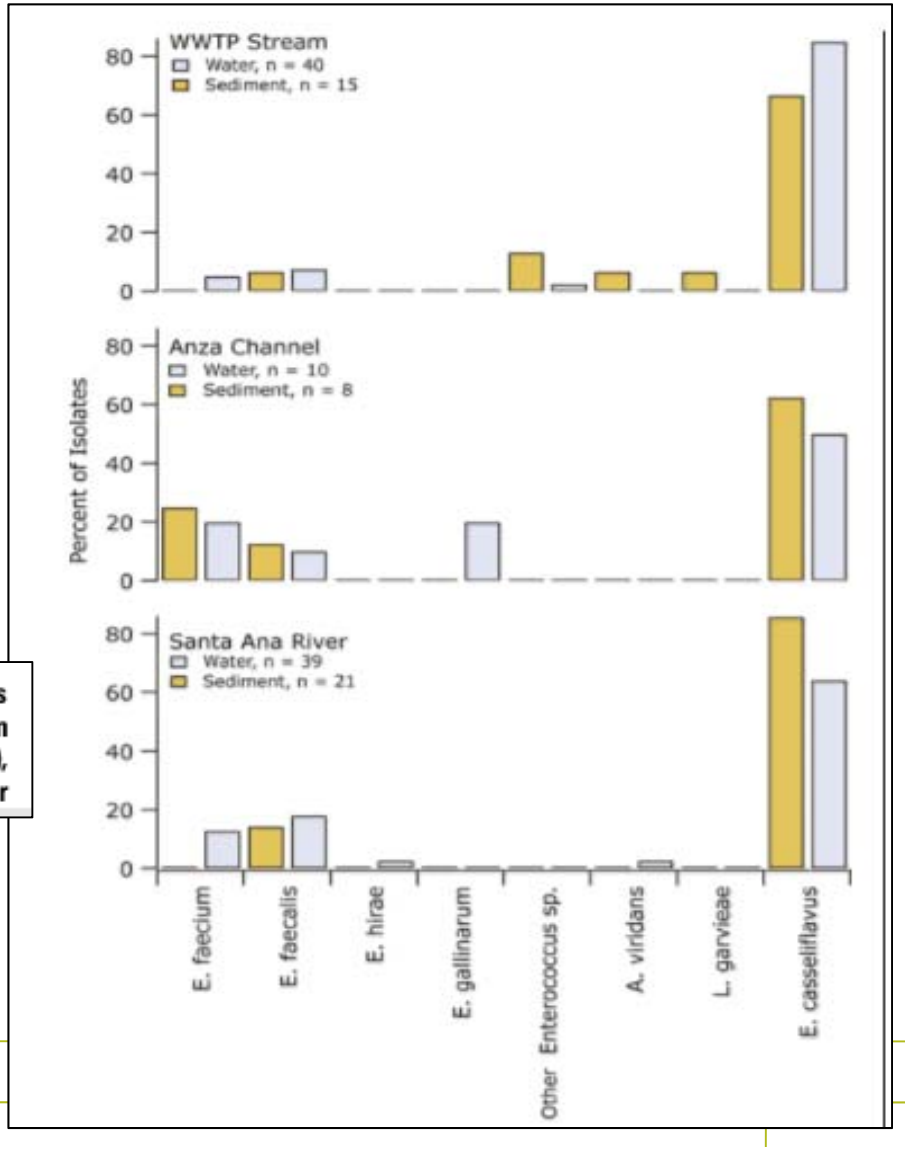


FIGURE 3. Species distribution of Enterococcus isolates cultured from water (blue bars) and sediment (brown bars) on September 14 (2009) from the WWTP effluent stream (top panel), urban runoff channel (middle panel), and Santa Ana River

Figure from Litton, Rachel M., Jong Ho Ang, Bram Sercu, Patricia A. Holden, David L. Sedlak, and Stanley B. Grant. Evaluation of Chemical, Molecular, and Traditional Markers of Fecal Contamination in an Effluent Dominated Urban Stream. Environ.Sci.Technol.2007, 41, (13), 4515–4521.

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Next Steps

- Continue to monitor priority 1-4 sites
- Modifications to RMP program as directed by Task Force
  - TMDL revision
  - CBRP implementation
  - Orange County priorities