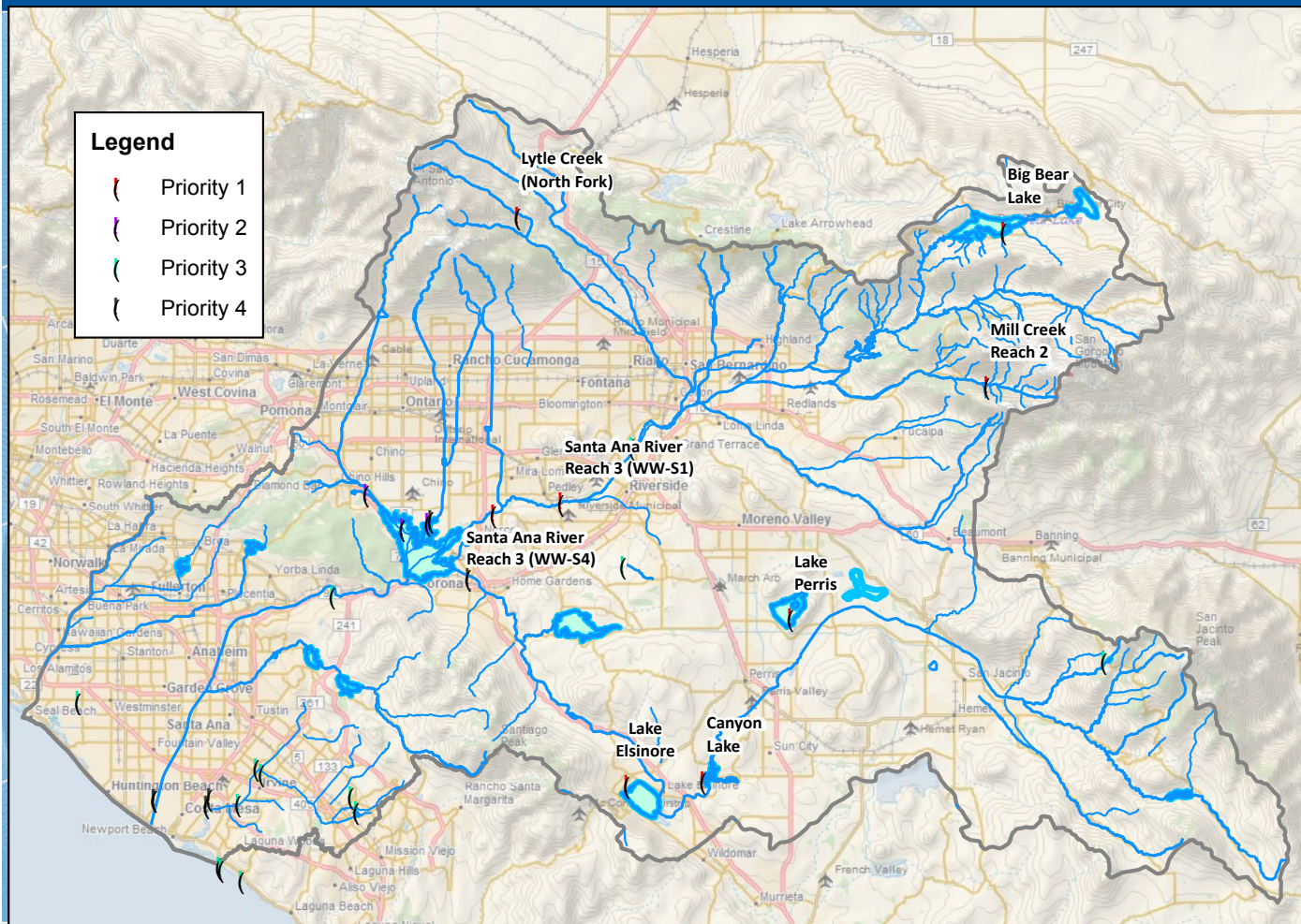


MSAR Watershed Synoptic Study of Bacteria Sources

May 29, 2019

Steve Wolosoff



**CDM
Smith**

Outline

- Project Kickoff
- Prior source contribution analyses
- 2019 synoptic survey study design

Kick Off

- Task order with GEI signed last week
- Draft study plan to be delivered prior to June 15
- Final study plan and details to be complete prior to July 15
- Sampling begins week of July 29 with collaboration between RCFC&WCD, SBCFCD, OCPHL, Pomona, Rialto WWTP, SBMWD
- Support from consulting team including Richard Meyerhoff, GEI serving as project manager and technical direction from Steven Wolosoff, CDM Smith and Menu Leddy, EEES

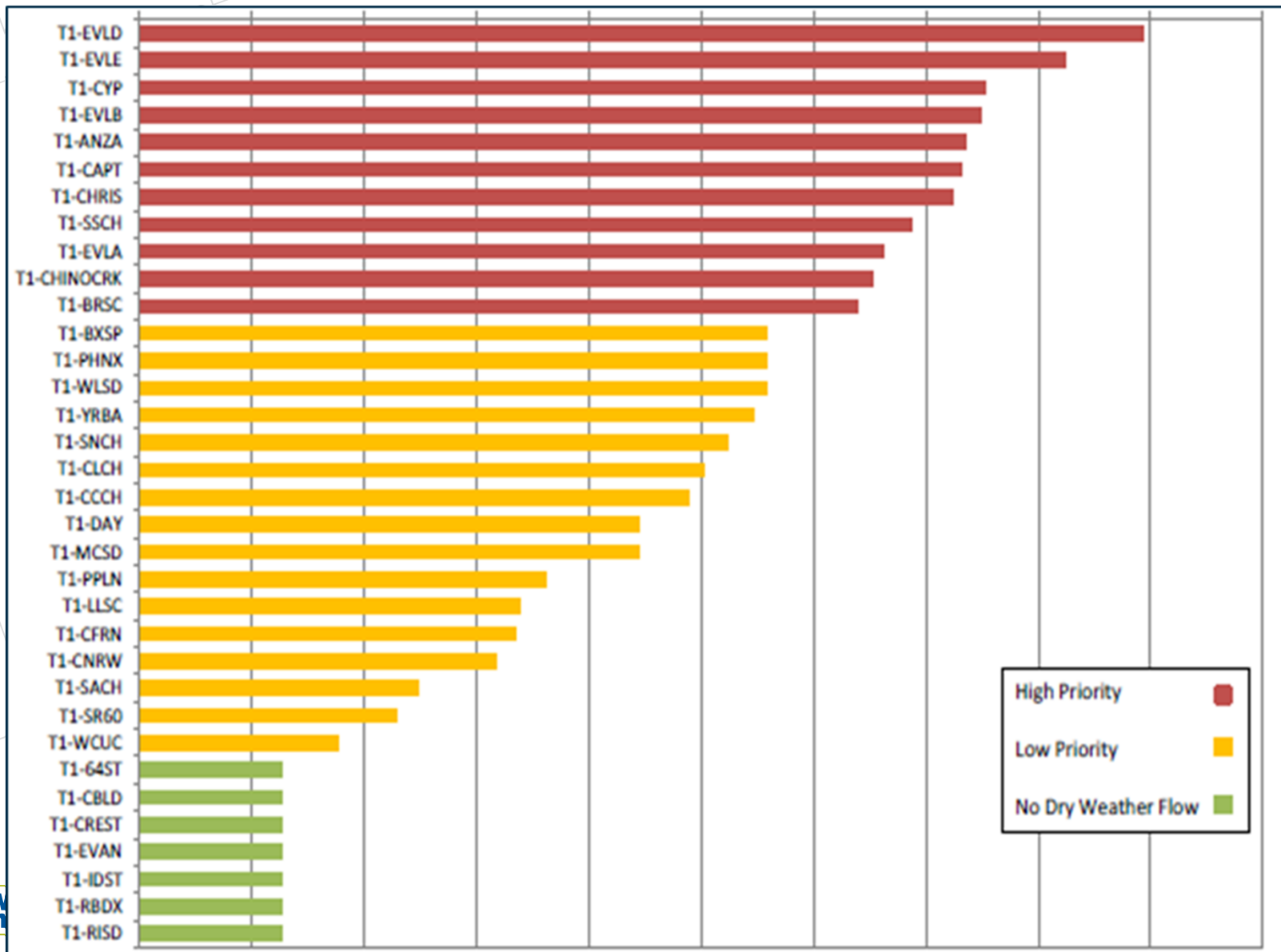


Prior Source Analyses

Tier 1 Inspection (2012)

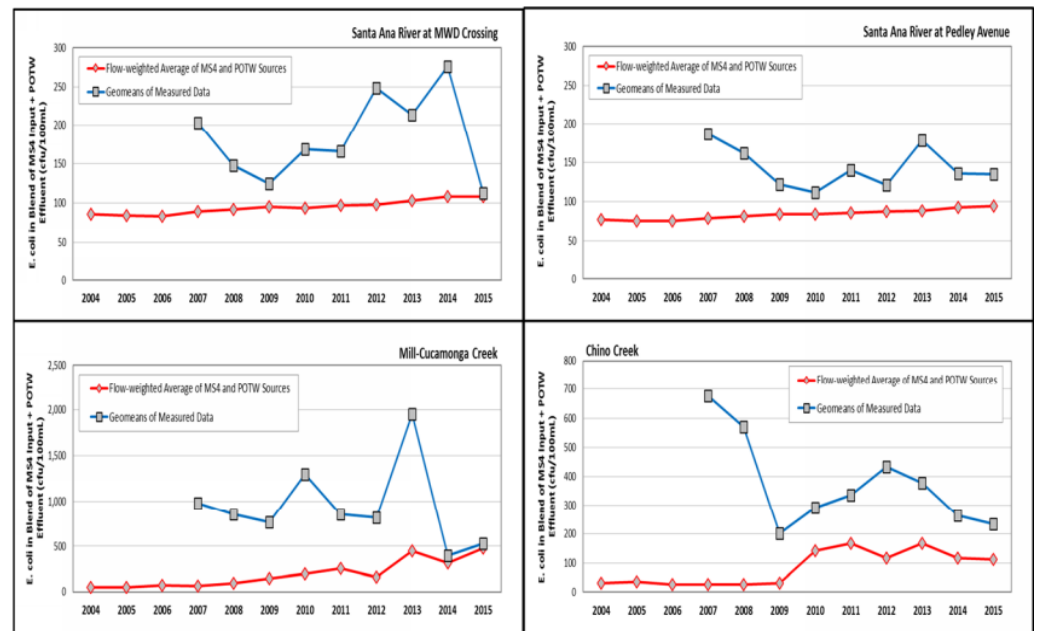
- Study was initial task in CBRPs for all three counties, built upon USEP (2007-2011)
- Accomplished two objectives
 - Prioritization of subwatersheds
 - Source contribution analysis
- Results provided basis for 2013 Triennial Review
- Tier 2 (within tributary areas) source tracking followed and served as basis for 2016 Triennial Review
- Since 2012 - many MS4 sources eliminated, CBRP implementation including aggressive outdoor water conservation BMPs deployments, and studies showing significant sources within waterways

Prioritization of Subwatersheds



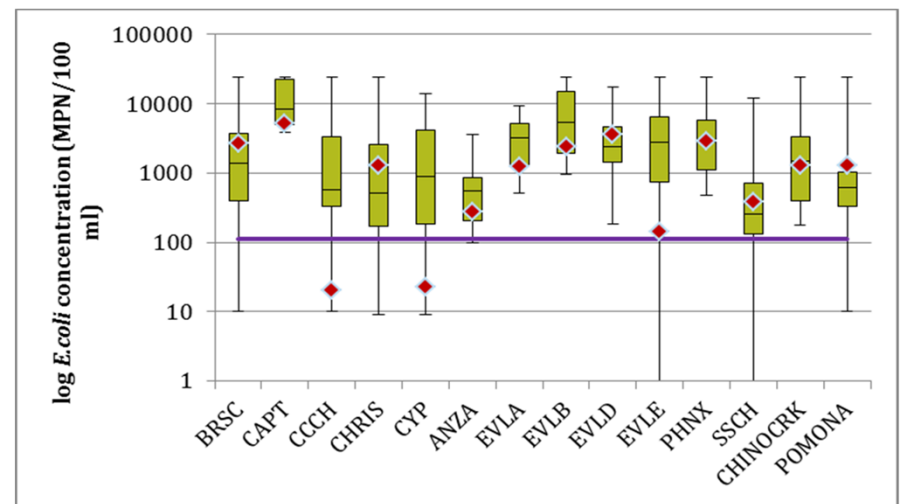
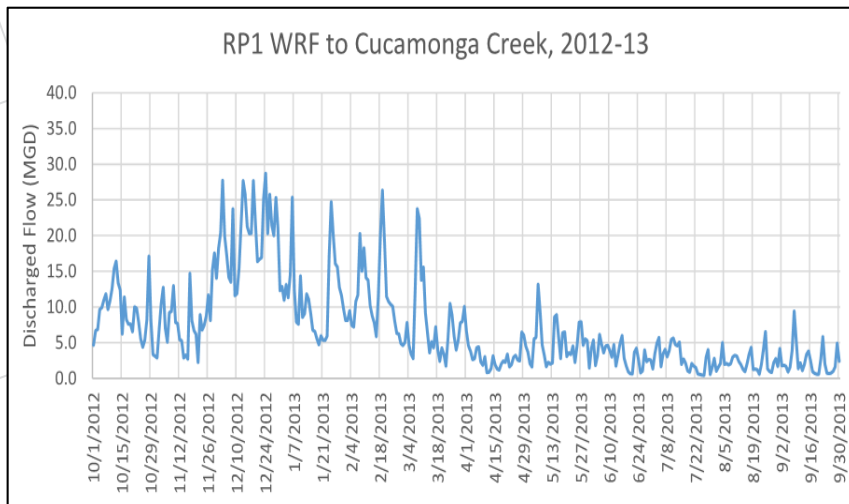
Source Contribution Analysis

- Source contribution analysis to relate upstream sources to downstream concentrations
 - Version 1 for CBRP compliance demonstration (2007-08)
 - Versions 2 and 3 in 2013 and 2016 Triennial Review Reports
- Task Force interprets increased concentration downstream to be from non-MS4 sources
- Need new data at Tier 1 sites to recompute estimated MS4+POTW blend for 2019



Uncertainty

- Accuracy of measuring low flow at Tier 1 sites
- Representativeness of flow measurements at time of sample
- In-stream decay or resuspension
- Fluctuation in WWTP discharge over course of sample day
- Variability in fecal bacteria at outfalls during dry weather



Tier 2 Programs

- Arlington greenbelt study
- Cucamonga Creek synoptic sampling
- Residential property scale bacteria study
- City specific bacteria source identification and elimination
- Uncontrollable bacteria sources study



MSAR Bacteria TMDL Synoptic Survey 2019

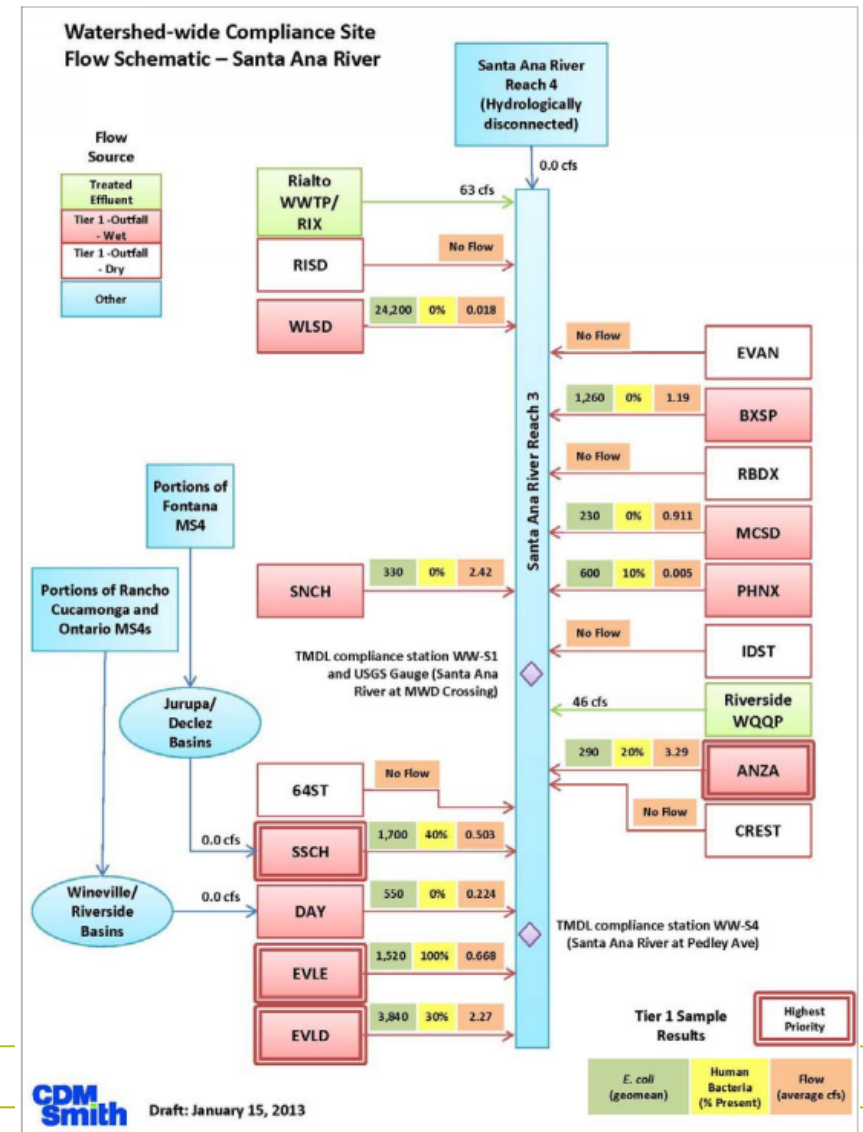
Synoptic Study Objectives

- Revisit prioritization of subwatersheds
- Update source contribution analysis accounting for changes in urban DWF, POTW effluent, CBRP implementation, and non-MS4 sources
- Develop updated dataset to serve as basis for TMDL revision



Source Contribution Analysis

- Measurement of loads at Tier 1 MS4 inflows and downstream stations
- Synoptic study leverages results of prior analyses
 - 99% of MS4 inflows to MSAR TMDL waters from 14 Tier 1 sites based on 2012 study
- Adding human *Bacteroides* DNA marker to analysis
- Adding strategic mainstem sample sites



Synoptic Study Sites

- Sites include Tier 1, Tier 2, POTW, and Mainstem
- Tier 1 sites account for over 99 percent of all measured MS4 inflows in 2012 sampling



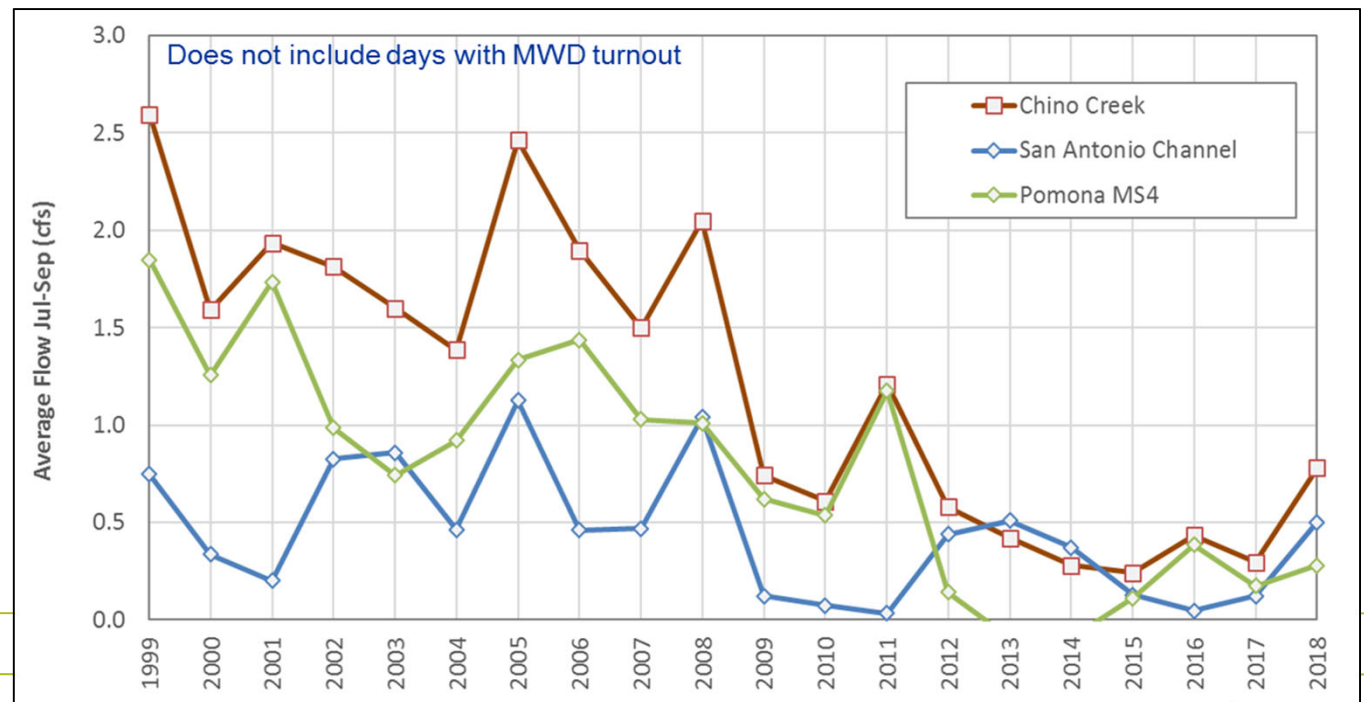
Synoptic Study Sampling Plan

- Concurrent sampling at sites in same watershed
- One event per week for six weeks from July 29 through September 9
- Field measured parameters (temperature, pH, DO, conductivity, flow rate)
- Lab analytes include *E. coli* and *Bacteroides* DNA marker HF183
- Sample collection at WWTPs for *Bacteroides* marker only
- Coordination with Regional Bacteria Monitoring Plan
 - Adding *Bacteroides* to TMDL compliance monitoring sites
 - Arranging for same day of sampling

Synoptic Study for Chino Creek (2019)

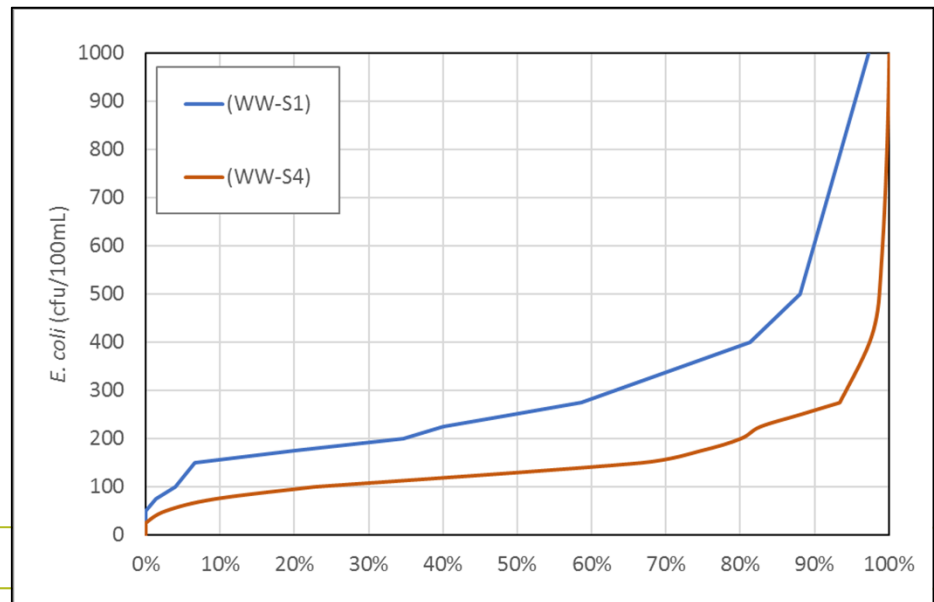
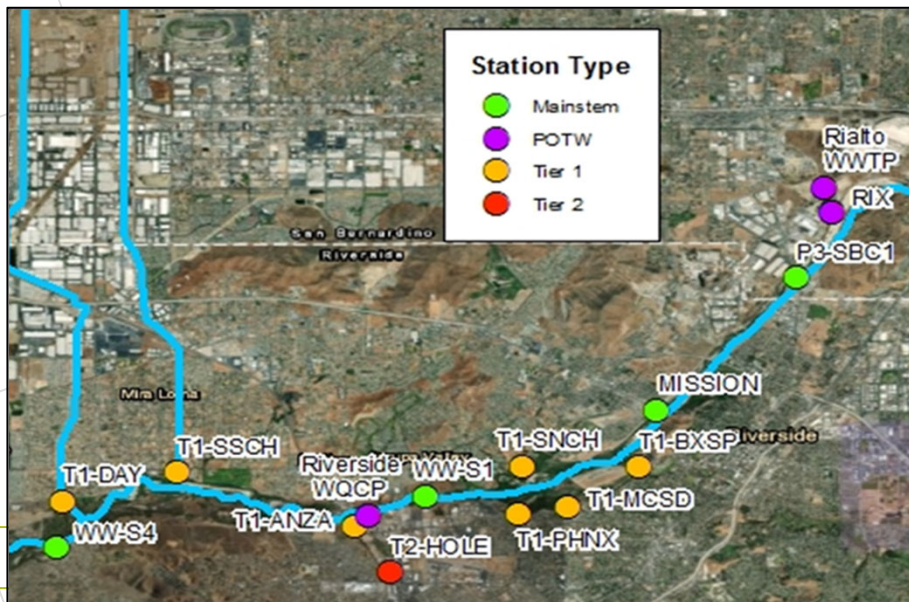
- USGS gauges (upstream of WWTPs) provides robust information on MS4 flows
- Water samples will evaluate changes to bacteria loads
- Human *Bacteroides* marker will support prioritization of MS4 inflows

Pomona, Claremont
MS4 is estimated
based on difference
in USGS gauges



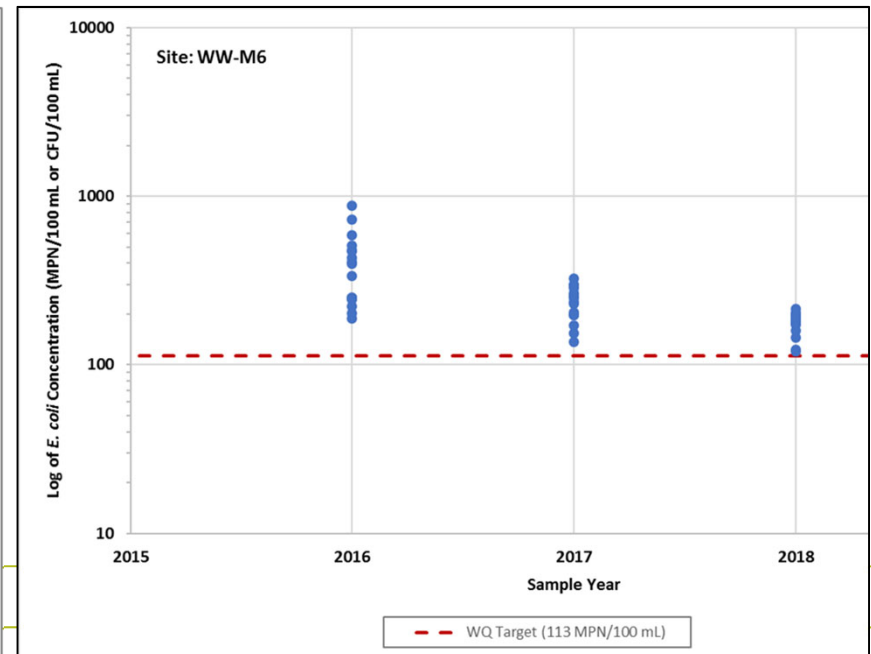
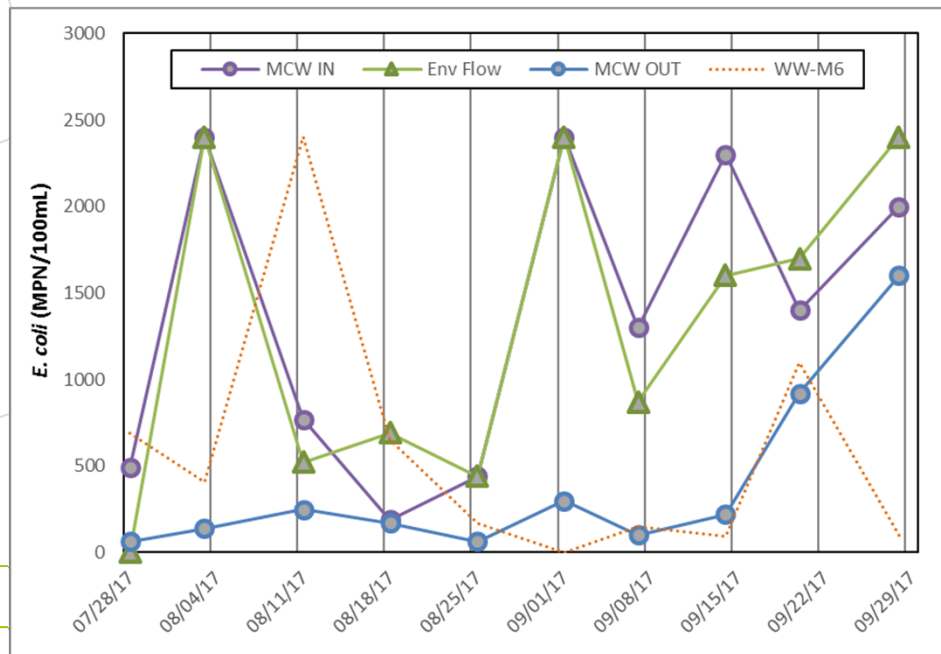
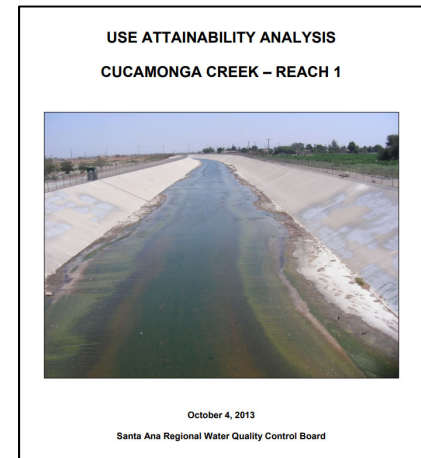
Synoptic Study for Santa Ana River

- Revisit finding that blend of MS4 and POTW inflows is below geomean criteria
- Collect data to better understand apparent reduction in bacteria concentration between upstream MWD Crossing (WW-S1) and downstream Pedley (WW-S4) sites
- Quantify non-MS4 sources of bacteria



Cucamonga Creek

- De-designation of Cucamonga Creek Reach 1 shifts focus of compliance to downstream Mill-Cucamonga Creek segment
- Mill Creek Wetland BMP is effectively reducing fecal bacteria
- Synoptic surveys conducted in 2016 and 2017 by SBCFCD

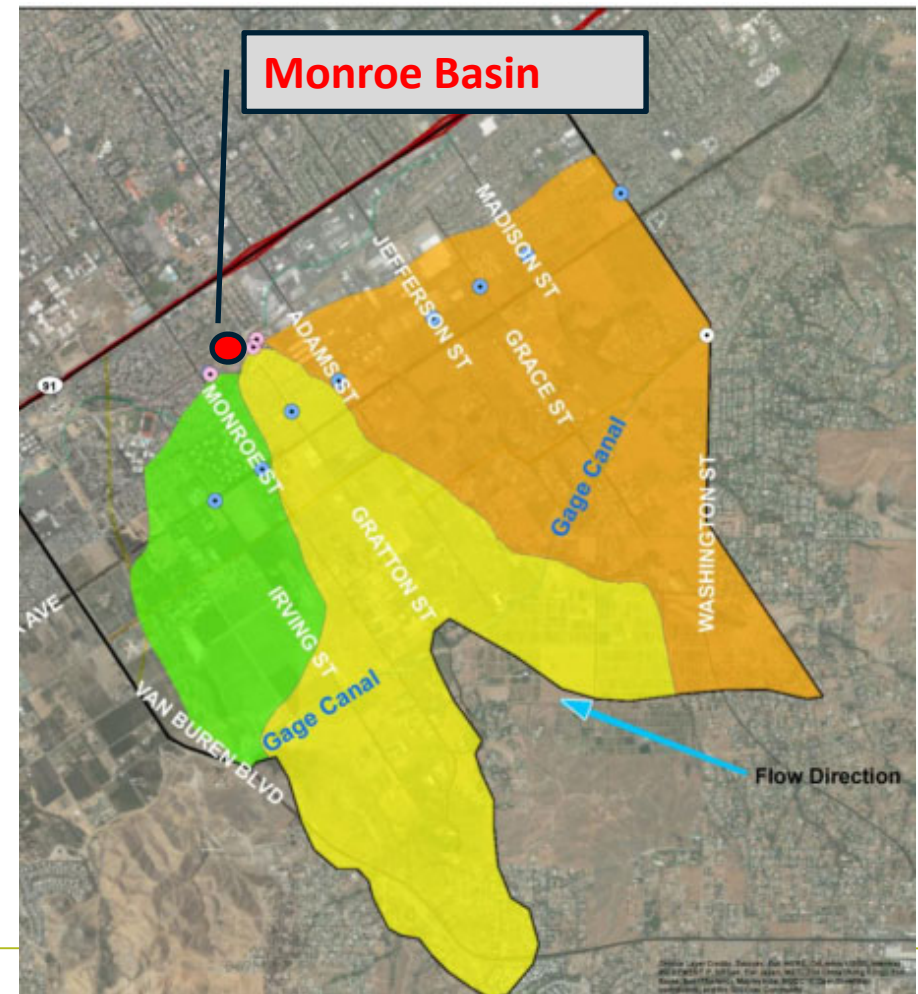




Tier 2 Sites

Arlington Greenbelt

- Arlington Greenbelt study showed agricultural furrow irrigation is a significant source of *E. coli* that must be accounted in synoptic study
- Synoptic study will put this drainage area into prioritization analysis



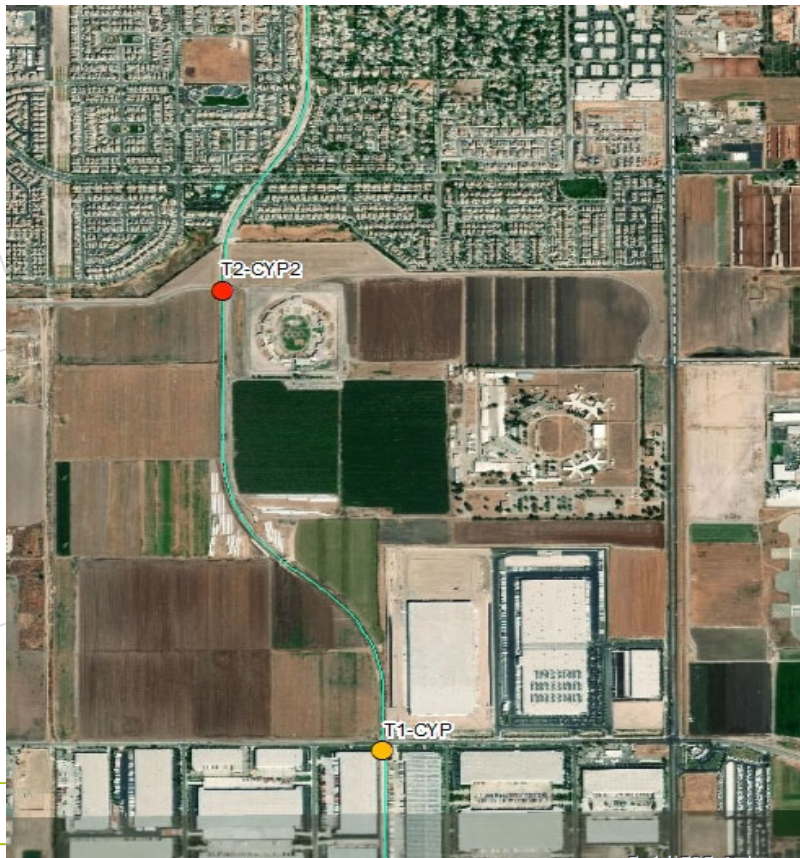
Bracketing Hole Lake

- New Tier 2 sites below Anza/Monroe confluence to isolate bacteria loads from Riverside MS4 and within stream sources in Hole Lake area



Bracketing Cypress Agricultural Fields

- Tier 2 site at Cypress Ave to isolate bacteria load from Chino MS4 and CIM fields



Upstream of CIM (T2-CYP2)



Downstream of CIM (T1-CYP)



Claremont MS4

- Most Claremont DWF in MSAR watershed is captured in basins along San Antonio Channel
- Tier 2 site on Mountain Ave (T2-CLARM) site to evaluate magnitude of Claremont DWF load passing through Pomona's MS4 to Chino Creek

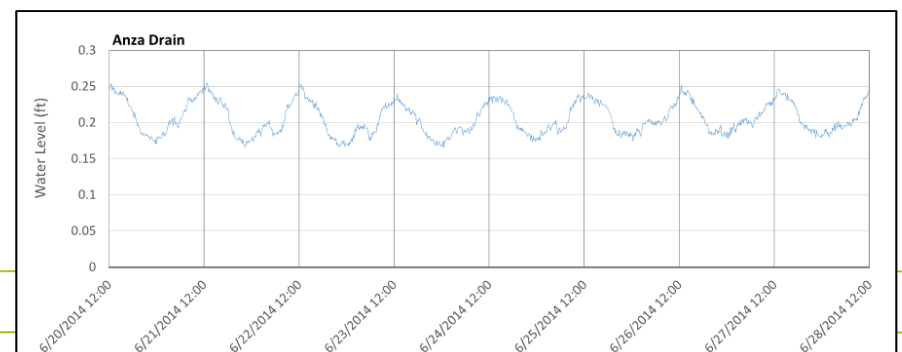
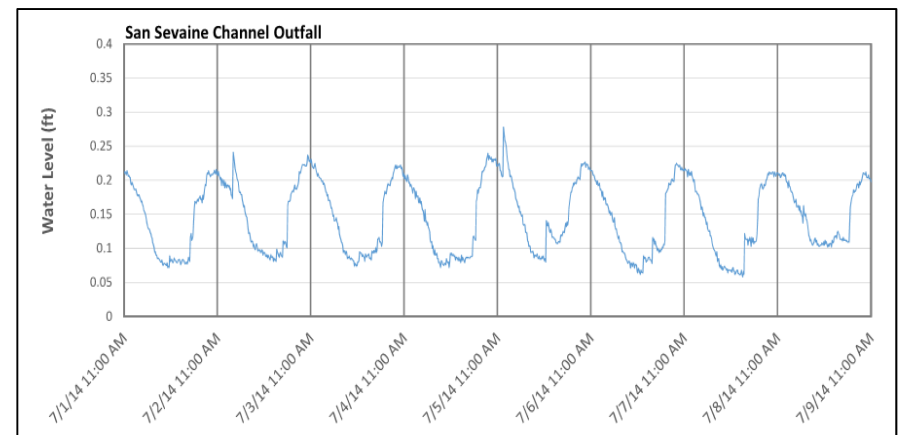


Dry Weather Flow Measurement

RCFC&WCD Sensors (2014)

- Diurnal water level fluctuation observed at most sites
- Sampling morning to early afternoon coincides with peak MS4 dry weather water levels

Site	Daily Average Peak Level (ft)	Peak Time of Day
Anza Drain	0.27	12:00
Box Springs	0.30	13:00
Cucamonga Creek	0.59	12:00
Day Creek	0.69	11:00
Eastvale Line A	0.38	10:00
Magnolia Center SD	0.38	6:00
San Sevaine Channel	0.19	10:00
Phoenix SD	0.60	6:00
Sunnyslope Channel	0.45	12:00



Flow Measurement Approach

- Collection of flow at time of sample would add a level of conservatism with slightly above average DWFs
- Alternative approach would involve deployment of continuous recording meters at multiple stations for the period of the study