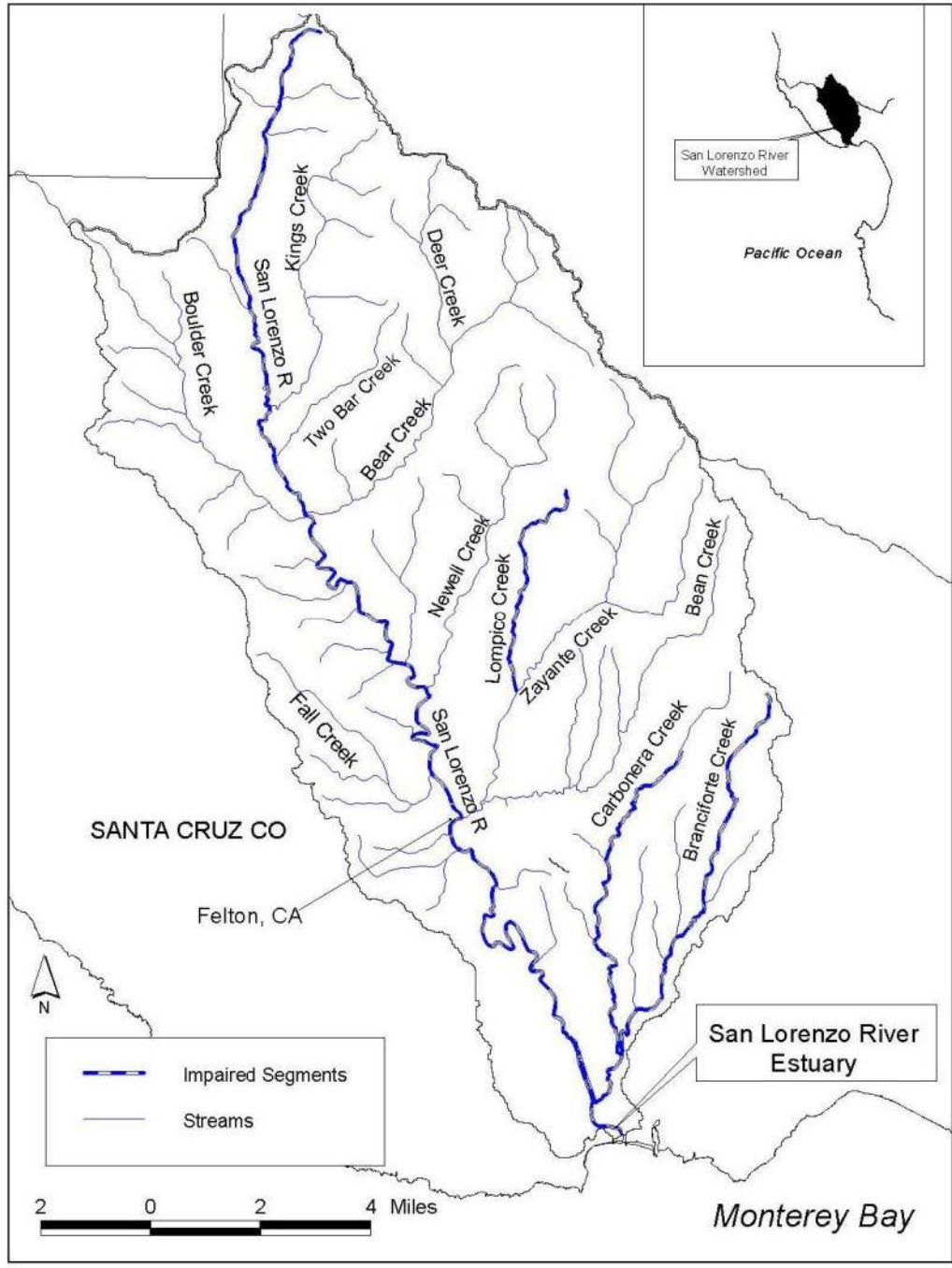**COASTAL WATERSHED COUNCIL**

COASTAL-WATERSHED.ORG

Preserving and protecting our coastal watersheds

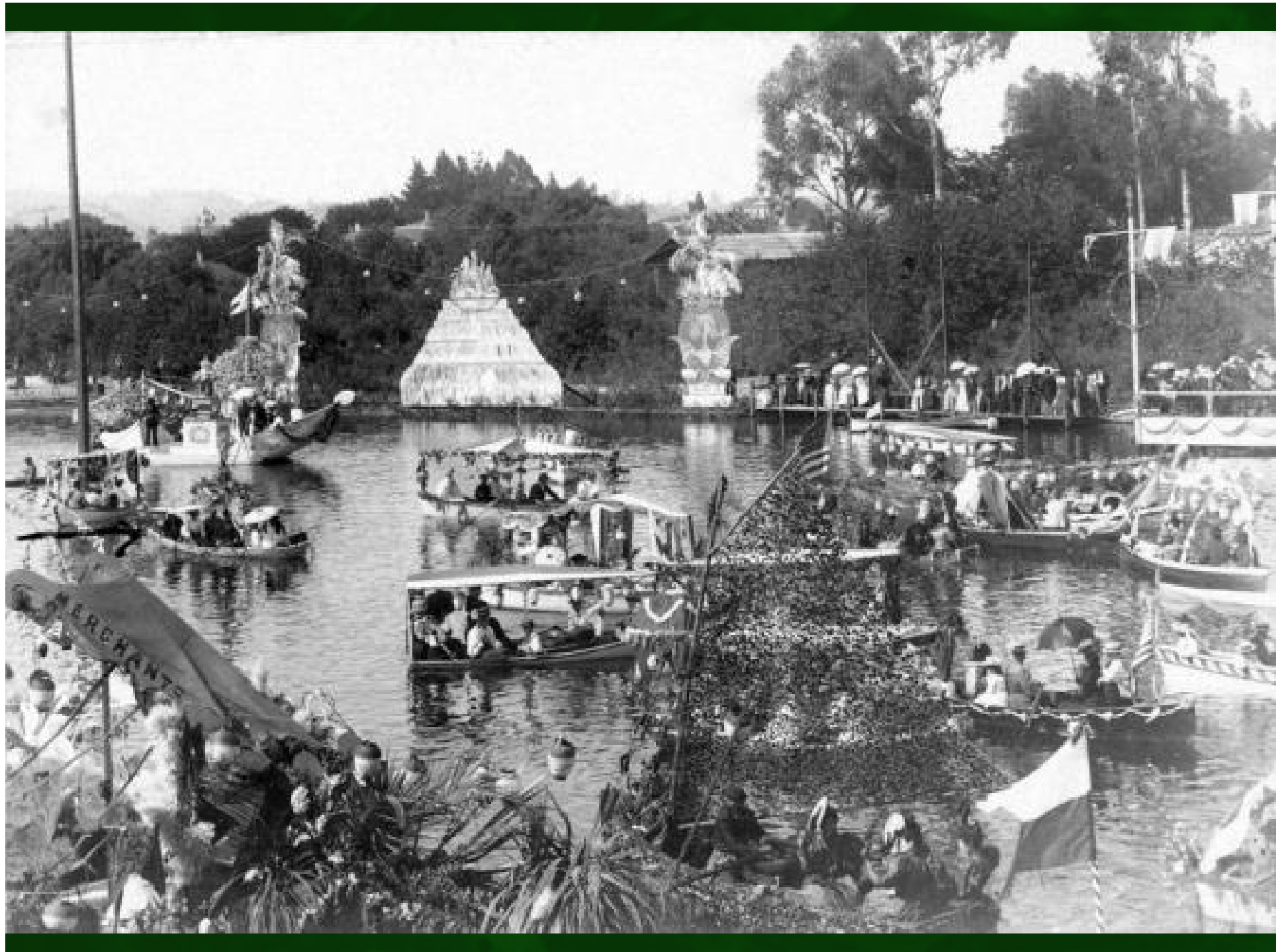Central Coast Regional Water Quality Control Board
November 19, 2015
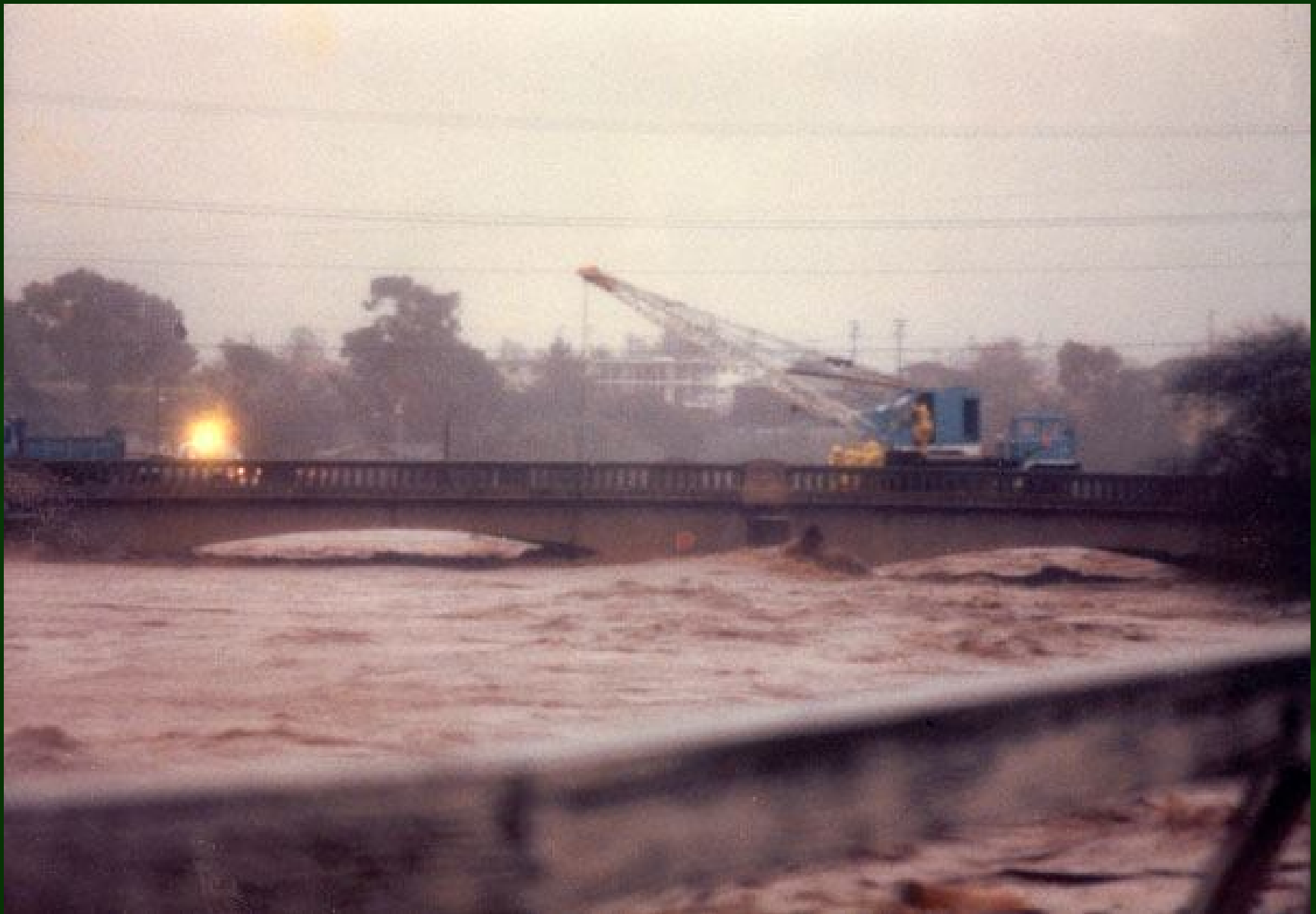Greg Pepping, Executive Director
Coastal Watershed Council

San Lorenzo River Watershed TMDLs
   Chlorpyrifos TMDL, *approved May 29, 2014*
   Pathogen TMDL, *approved May 8, 2009*
   Sediment TMDL, *approved May 16, 2003*
   Nitrate TMDL, *approved September 15, 2000*

Central Coast Water Board - *approved May 8, 2009.*

State Water Resources Control Board - *approved March 1, 2011.*

Office of Administrative Law (OAL) - *approved June 8, 2011,* which is the effective date.

USEPA - *approved July 20, 2011.*

Water Quality Working Group

Bacteria in the San Lorenzo River

- Fecal indicator bacteria (FIB) are most commonly used to measure pathogens:
  - E.coli
  - Enterococcus
  - Total coliform
- Limitations of FIB

What: Guiding Questions

- What is the level of human bacterial contamination in the lower San Lorenzo River?

- What are the key sources of human bacterial contamination in the lower San Lorenzo River?

What: Guiding Questions

- What is the level of human bacterial contamination in the lower San Lorenzo River?

- What are the key sources of human bacterial contamination in the lower San Lorenzo River?

When?

- Dry season
- Tidal influences avoided
- Early in the day

2014 DATES

- Wednesday, May 21, 10 am start
- Thursday, June 19, 10 am start
- Thursday, July 17, 9 am start
- Monday, August 18, 10 am start
- Monday, September 15, 10 am start
- Wednesday, October 15, 10 am start

Where? 6 Sites

1) SLR (downstream) at the mouth/trestle bridge
2) SLR (upstream of main urban area inputs) at Tait Street
3) SLR (upstream) at Sycamore Grove
4) Branciforte Cr. u/s from confluence with SLR @ start of concrete channel
5) Carbonera Cr. u/s from confluence with B-40
6) Branciforte Cr. u/s from confluence with Carbonera
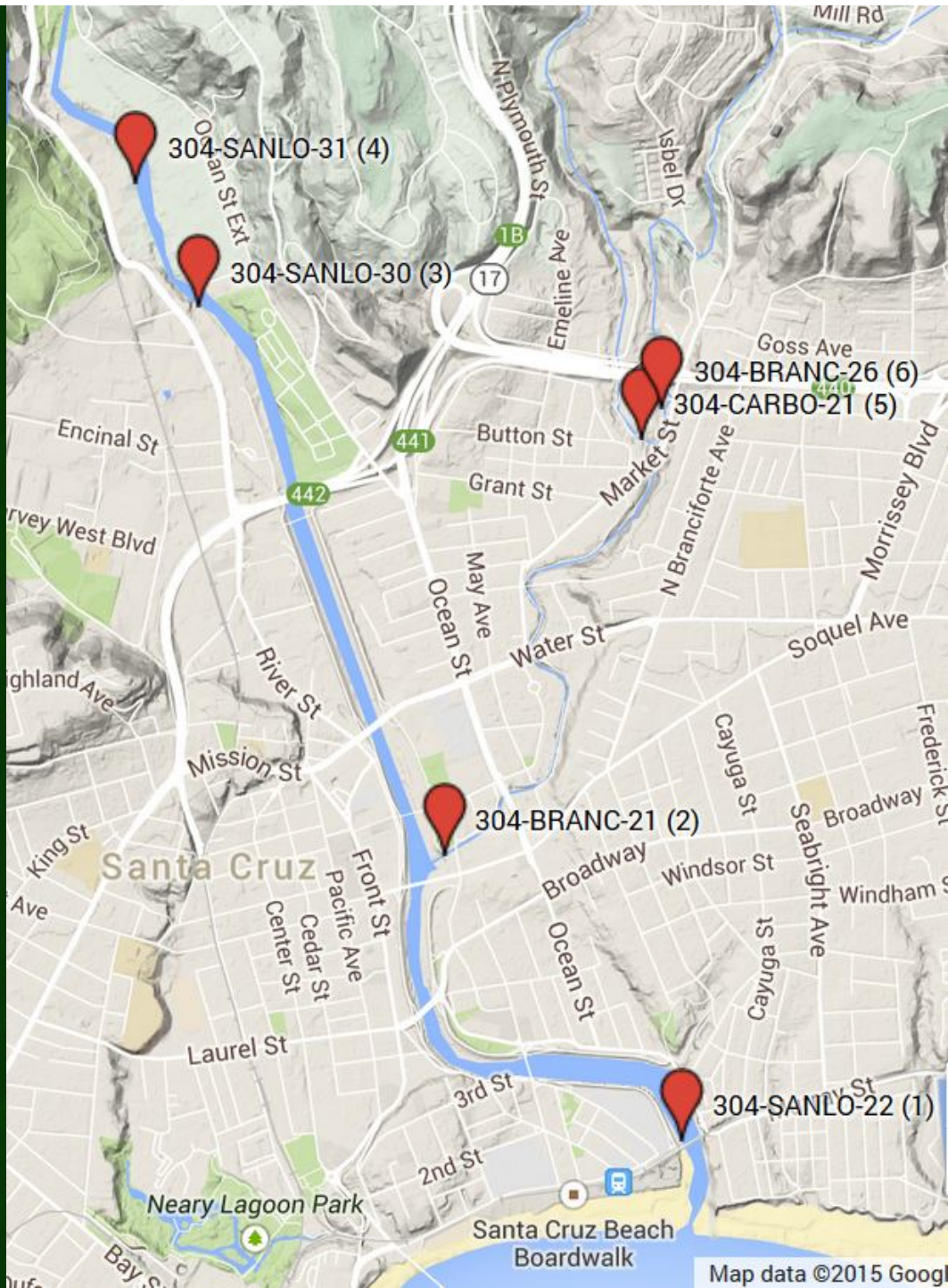
How: Modernizing Our Toolkit …and collaborating

- Fecal sterols
- FIB
- DNA testing
- Caffeine

- MULTIPLE LINES OF EVIDENCE

Fecal Sterol Results: Human Fecal Indicator #1

Human Fecal Indicator
Coprostanol:Cholestanol Ratios by Sample Collection Date

Site	5/21/14	6/19/14	7/17/14	8/18/14	9/15/14	10/15/14
			Est. from Cholestanol means			
San Lorenzo Lagoon	0.13	0.17	*0.10*	*0.09*	0.11	0.09
San Lorenzo @ Tait	0.09	0.40	*0.20*	*0.21*	0.26	0.28
SLR @ Sycamore Grove	0.10	1.56	*0.13*	*0.21*	0.15	0.24
Branciforte u/s of SLR	0.05	0.20	*0.27*	*0.10*	0.11	0.72
B40 u/s of Carbonera	0.35	0.20	*0.24*	*0.13*	0.14	0.18
Carbonera u/s of B40	0.21	0.13	*0.11*	*0.21*	0.32	0.19
Monthly averages:	0.15	0.44	*0.18*	*0.16*	0.18	0.28

Human Fecal Indicator: ratio>0.5

[Ratio 1 from Ahmed et al. 2011, Table 21.2]

Fecal Sterol Results: Human Fecal Indicator #2

Site	**Human Fecal Indicator** Coprostanol:(Cholestanol+Coprostanol) Ratios by Sample Collection Date					
	5/21/14	**6/19/14**	**7/17/14**	**8/18/14**	**9/15/14**	**10/15/14**
			Est. from Cholestanol means			
San Lorenzo Lagoon	0.12	0.15	*0.09*	*0.08*	0.10	0.08
San Lorenzo @ Tait	0.08	0.29	*0.17*	*0.18*	0.20	0.22
SLR @ Sycamore Grove	0.09	0.61	*0.12*	*0.18*	0.13	0.19
Branciforte u/s of SLR	0.05	0.16	*0.21*	*0.09*	0.10	0.42
B40 u/s of Carbonera	0.26	0.17	*0.19*	*0.11*	0.12	0.15
Carbonera u/s of B40	0.17	0.11	*0.10*	*0.17*	0.24	0.16
Monthly averages:	0.13	0.25	*0.15*	*0.14*	0.15	0.20

Human Fecal Indicator: ratio>0.7

[Ratio 4 from Ahmed et al. 2011, Table 21.2]

Fecal Sterol Results: Avian Fecal Indicator

Avian Fecal Indicator
Cholestanol:(Cholestanol+Coprostanol+Epicoprostanol) Ratios by Sample Date

Site	5/21/14	6/19/14	7/17/14	8/18/14	9/15/14	10/15/14
			Est. from Cholestanol means			
San Lorenzo Lagoon	86%	83%	87%	88%	82%	84%
San Lorenzo @ Tait	91%	69%	76%	76%	66%	64%
SLR @ Sycamore Grove	90%	38%	81%	76%	77%	68%
Branciforte u/s of SLR	94%	82%	77%	88%	86%	56%
B40 u/s of Carbonera	72%	81%	74%	81%	78%	74%
Carbonera u/s of B40	82%	87%	82%	76%	67%	73%
Monthly averages:	0.86	0.73	*0.80*	*0.81*	0.76	0.70

Avian Fecal Indicator: ratio>67%

[Ratio 10 from Ahmed et al. 2011, Table 21.2]

Caffeine

- Indicator of human contribution
- ELISA test (detects antibodies)
- Used by City of Santa Cruz Wastewater Treatment Lab
- Very low detection limit
- Results: 0 of 36 samples in this study showed any caffeine
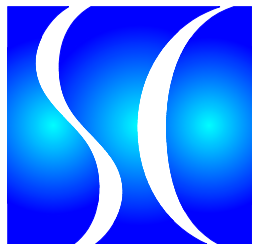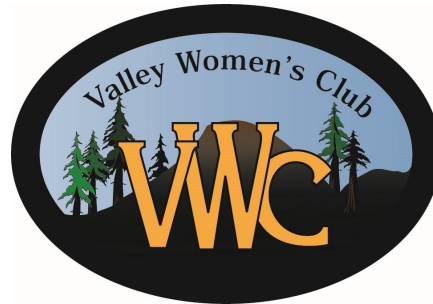
DNA

- Human bacteriodes

- County Environmental Health Lab

- 3 of the 36 samples detected quantifiable levels of human bacteriodes

- Consistent with a 2003 study by the County, showing most of the bacteria load in the SLR was from birds

Next Steps

- Repeat in a non-drought year (not 2015)
- Continue with source identification & prioritization process
- Evaluate whether TMDL numeric targets and allocations could be reconsidered
- Eliminate human sources of pathogens in the San Lorenzo
- …and reconnect the community to the San Lorenzo River
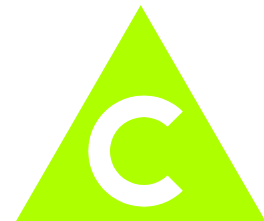
SAN LORENZO RIVER ALLIANCE

CITY OF SANTA CRUZ

Valley Women's Club
VWC

THE GREAT SEAL OF THE COUNTY OF
1850
SINE PRAEJUDICIO
SANTA CRUZ

RESOURCE
CONSERVATION DISTRICT
OF SANTA CRUZ COUNTY

SANTA CRUZ CHAMBER OF COMMERCE

COASTAL WATERSHED COUNCIL
COASTAL-WATERSHED.ORG
Preserving and protecting
our coastal watersheds

SANTA CRUZ MUSEUM
of natural history

C
ARTS COUNCIL
SANTA CRUZ COUNTY
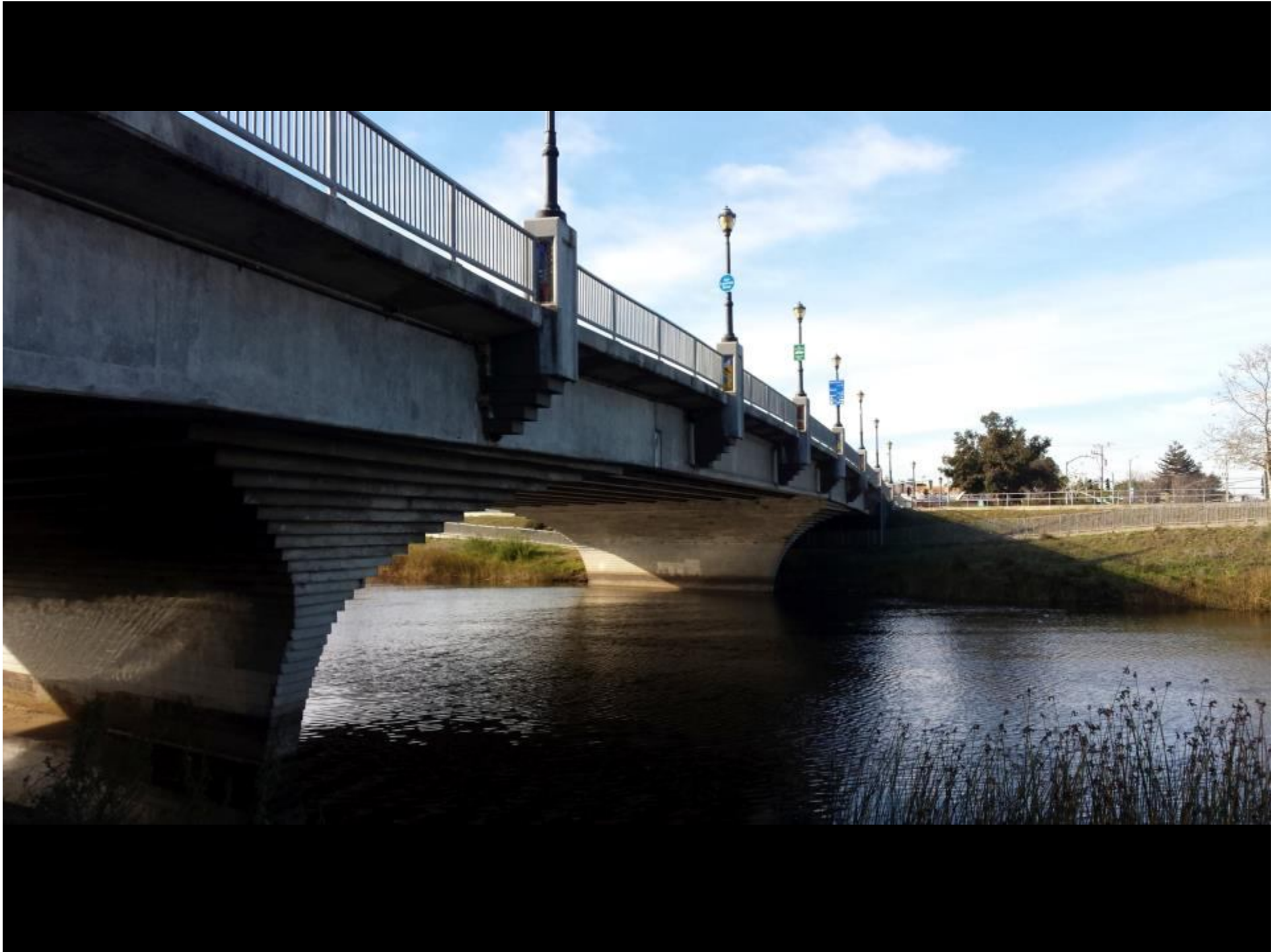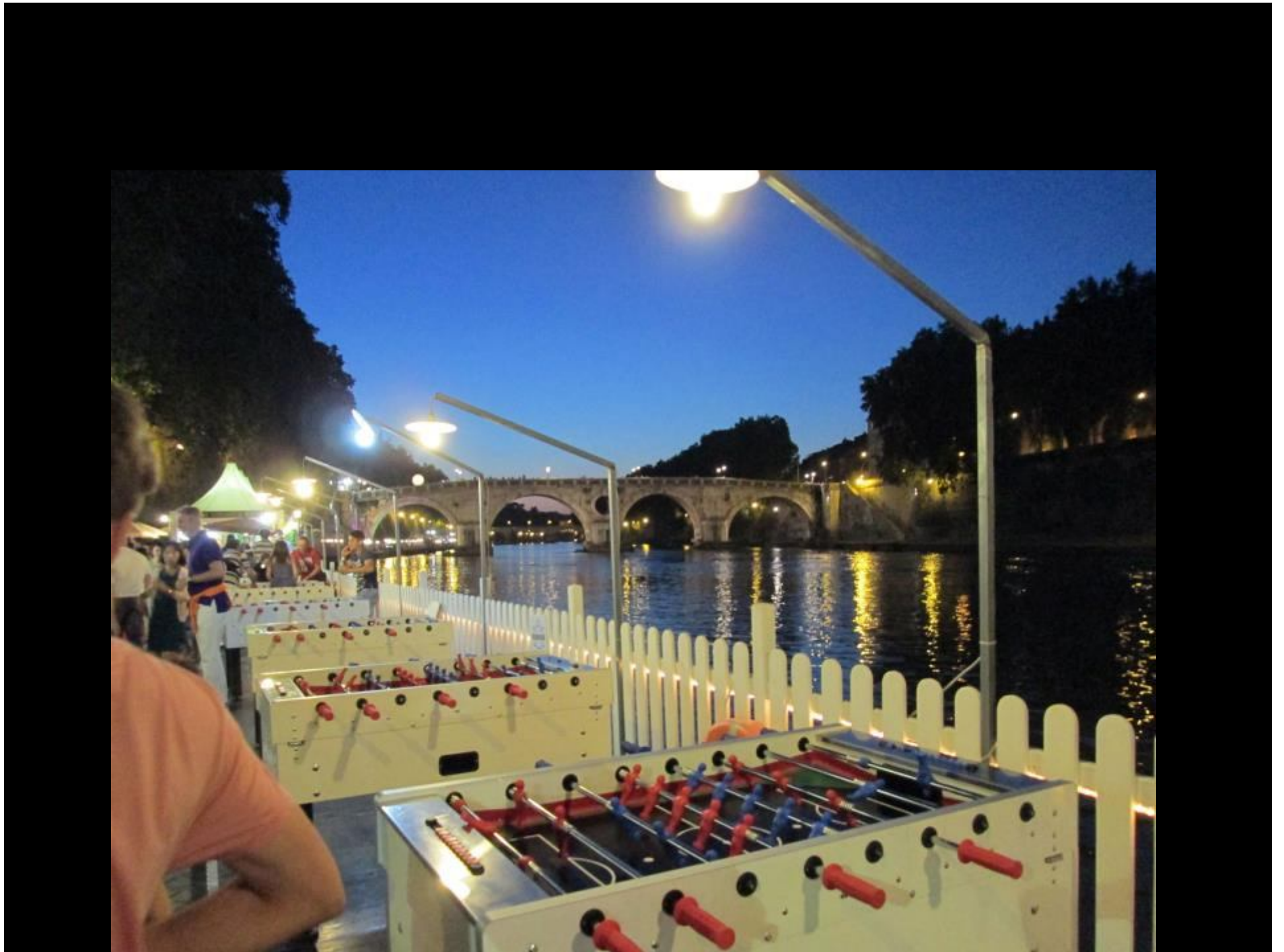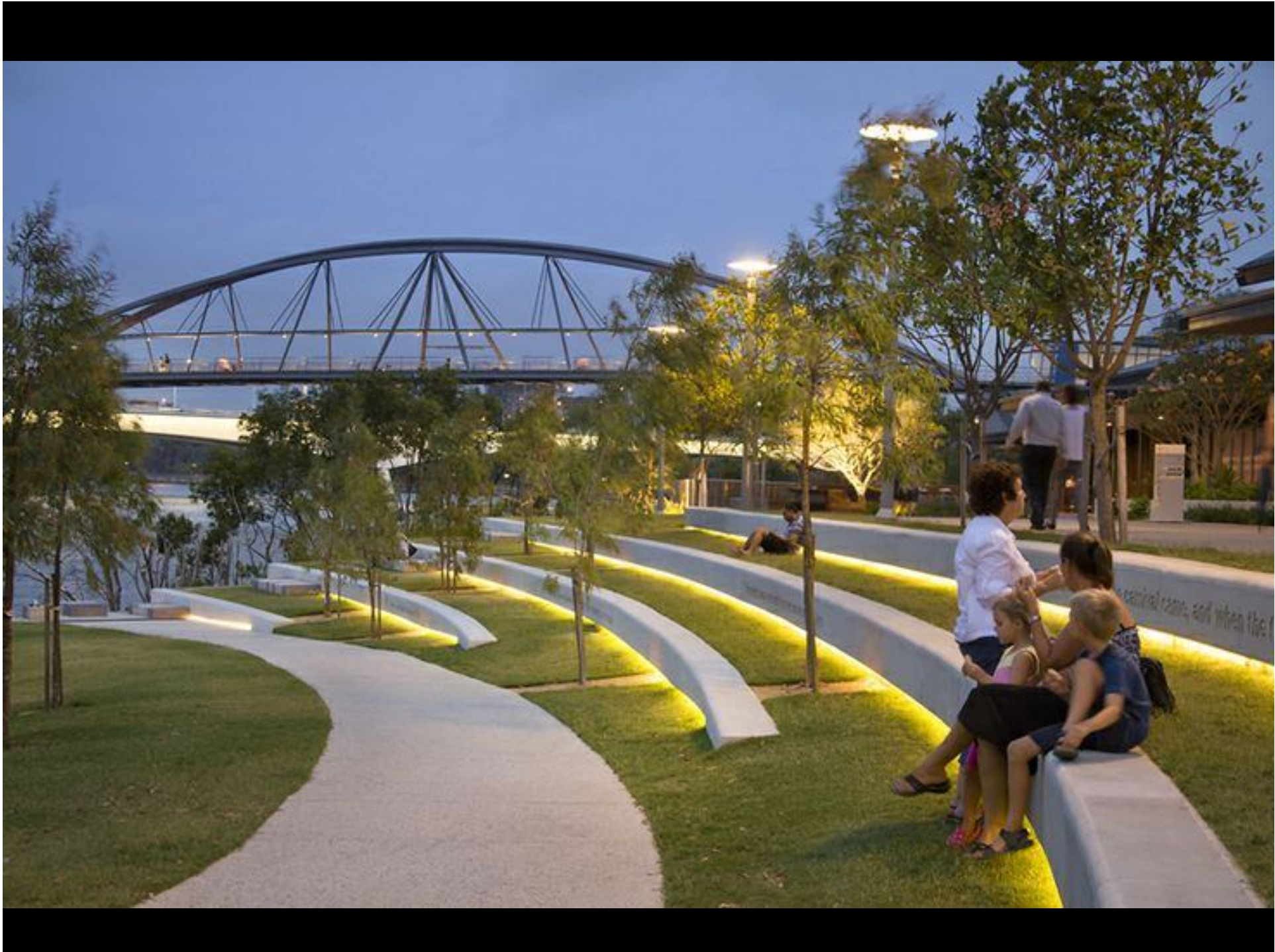
BROOKDALE CAL.
RAYHOS. Photo.

7181   ueen Anita's Barge & Gondolas coming up the River. Santa Cruz Carnival. June. 1895.   Photo., San Francisco. Cal.

Questions & Comments

- ## Greg Pepping
  Executive Director
  Coastal Watershed Council
  345 Lake Ave., Suite F
  Santa Cruz, CA 95062
  (831) 464-9200
  gpepping@coastal-watershed.org