

CACHE CREEK SETTling BASIN

Operations & Maintenance

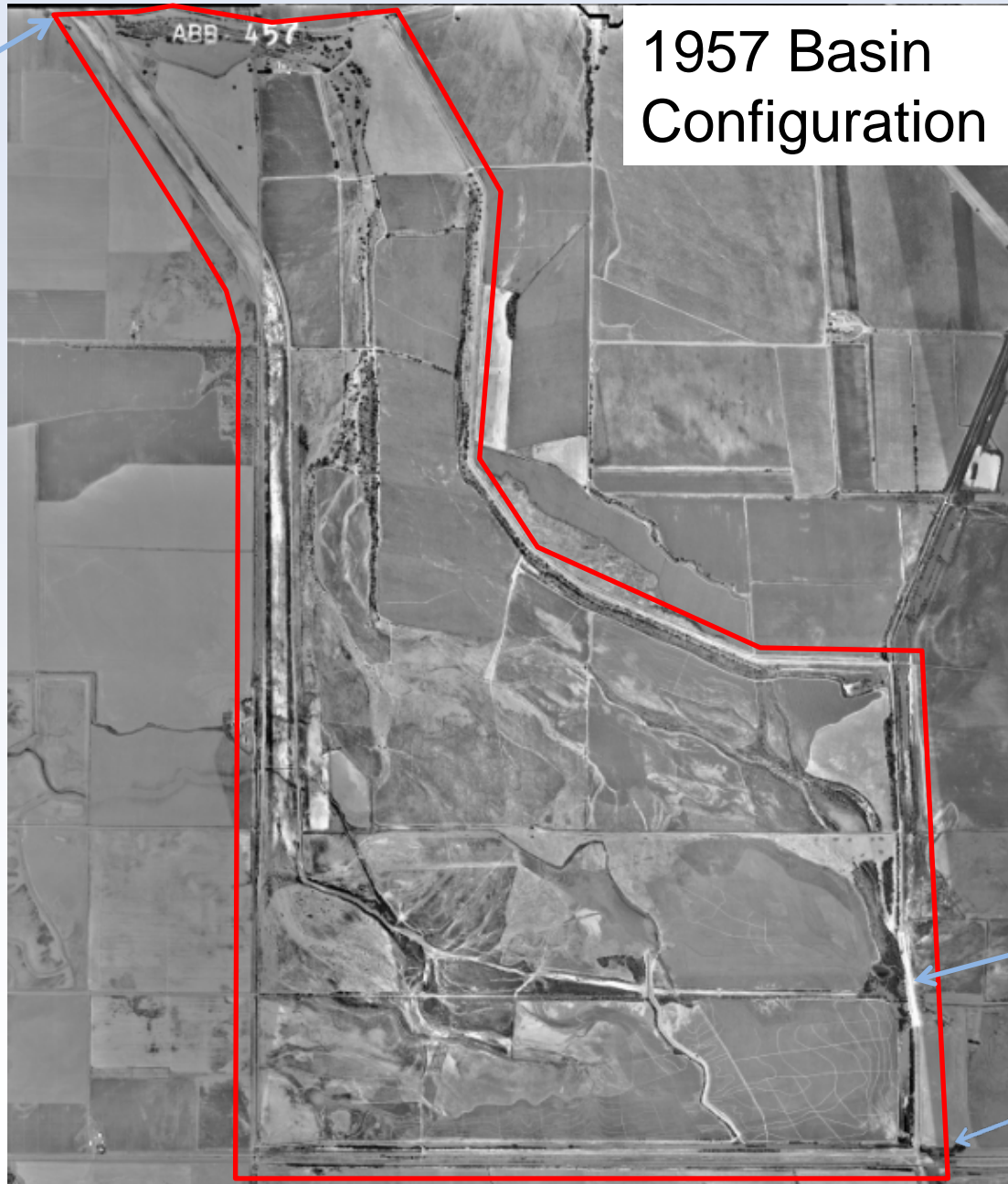
Central Valley Flood Protection Board
February 27, 2015
Sacramento, CA

John Nosacka, P.E.
CA Department of Water Resources
Sacramento, CA



Inlet

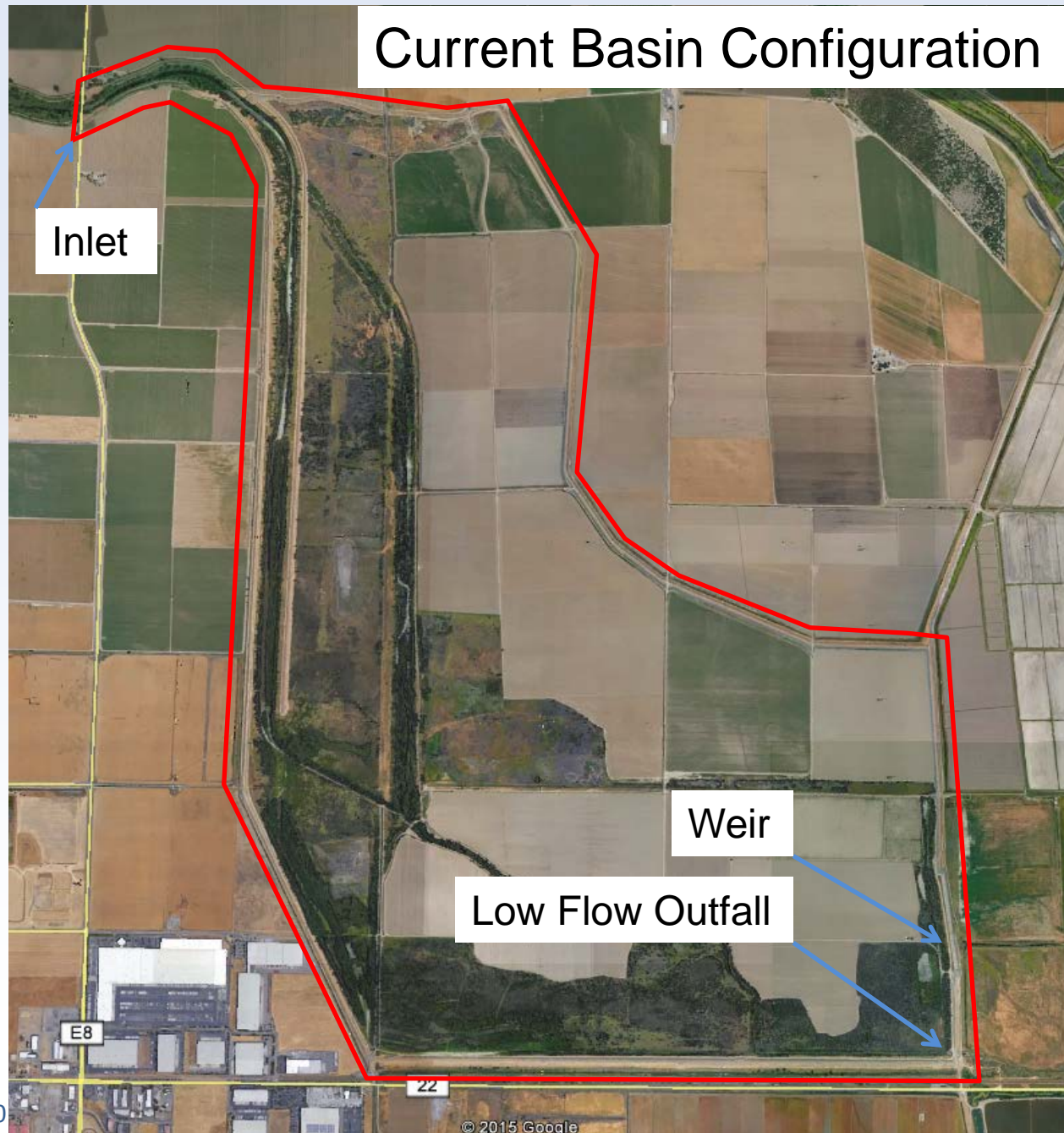
1957 Basin Configuration



Coble Weir

Outfall

Current Basin Configuration



2/26/20



Flood Control Project Authorization

- Basin Enlargement was authorized for construction in 1993 by the Water Resources Development Act of 1986, PL 99-662
- O&M Requirements were established in accordance with Title 33 Code of Federal Regulations, Section 209.10(a)
- Design $Q = 30,000$ cfs
- 50 Year Project Life (1993 – 2043)
- Minimum trap efficiency requirement of 30%



Delta Mercury Control Program TMDL & BPA

The CA Regional Water Quality Control Board's Delta Methylmercury TMDL has identified:

- 1. Department of Water Resources**
- 2. Central Valley Flood Protection Board**
- 3. U.S. Army Corps of Engineers**

as agencies responsible for discharging mercury and methyl mercury into the Yolo Bypass.

This Cache Creek Settling Basin TMDL requires a mercury reduction plan to *decrease the mercury loads from the Basin, up to and including a 50% reduction from existing loads.*



Routine Maintenance Efforts

- Levee Maintenance
- Channel Maintenance
- Flood Control Structure Repairs



Levee Maintenance

- Levee Crown Roads resurfaced with aggregate base
- Vegetation control of levees by mowing, spraying or burning
- Rodent abatement and repairing of holes



Channel Maintenance

- Vegetation Management within the training channel
- Maintain Low Flow channel to assure conveyance and alignment



Flood Control Structure Repair

- Low Flow Outfall Gate recently repaired
- Roller Compacted Concrete Weir was patched
- Proposed Weir apron re-grading project required to minimize scour

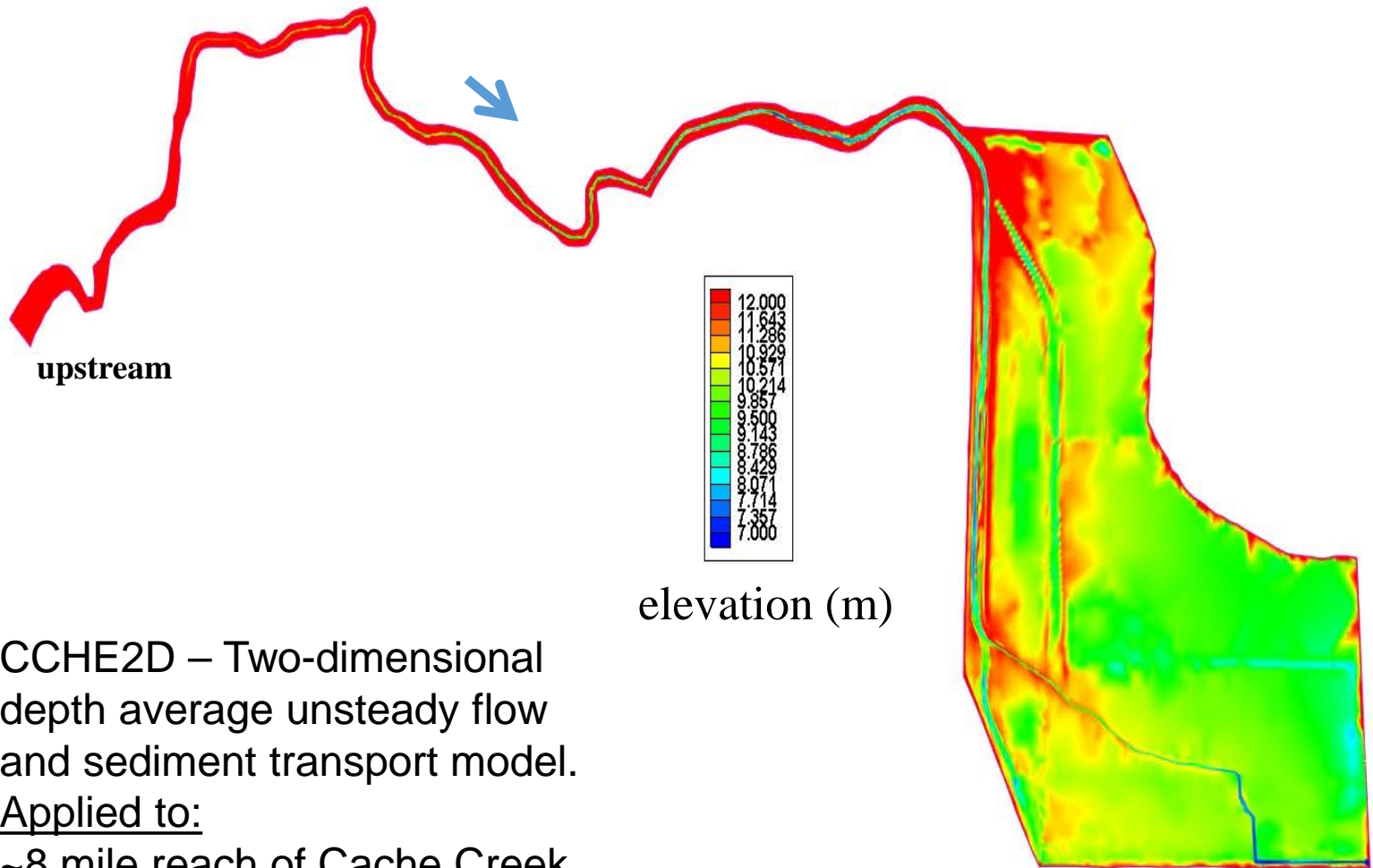


Cache Creek Settling Basin Special Studies

1. Trap Efficiency Study (UCD)
USACE O&M Requirements
2. Mercury Characterization Studies (USGS)
RWQCB TMDL Requirements



Numerical Modeling of Cache Creek and the CCSB



CCHE2D – Two-dimensional
depth average unsteady flow
and sediment transport model.

Applied to:

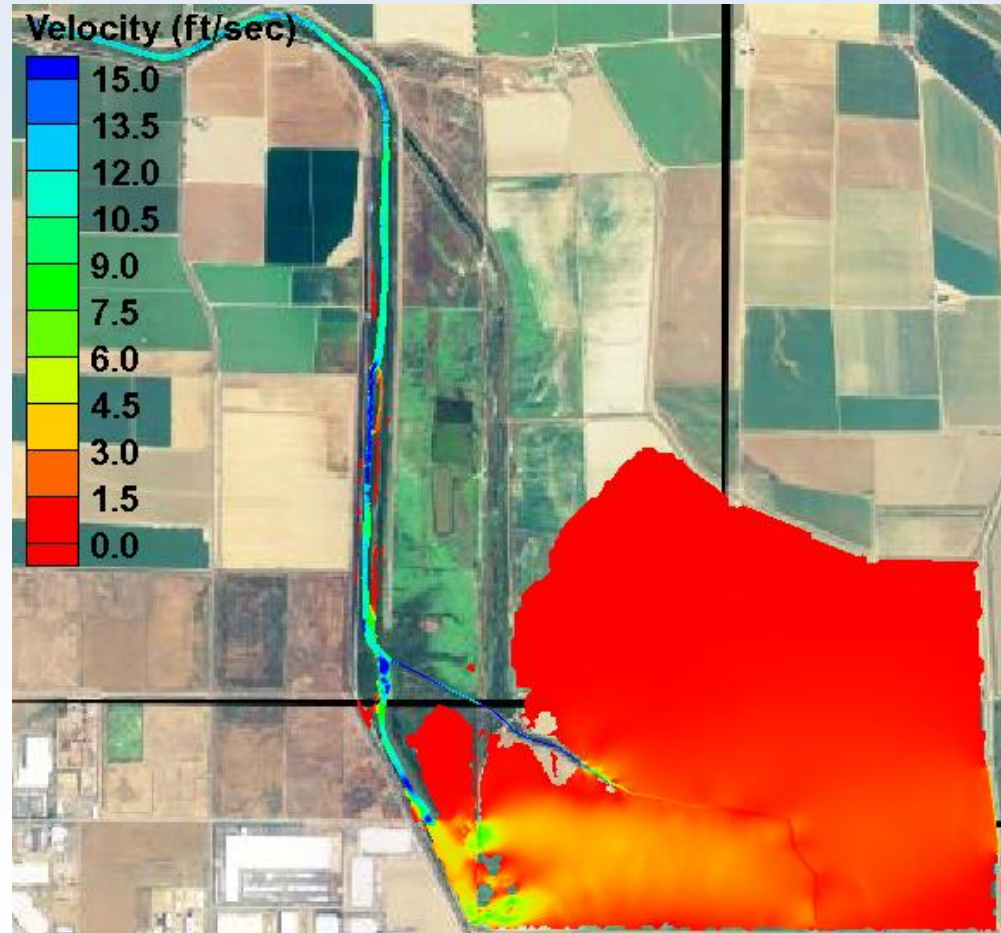
~8 mile reach of Cache Creek

~5.6 mile² Settling Basin



Trap Efficiency Study Results (UCD)

- Preliminary Results
Trap Efficiency is 65%
- Numerical Modeling
results are consistent
with the USGS sediment
load calculations
- High confidence in the
model calibration for
flows up to 14,200 cfs



Mercury Characterization Study (USGS)

Project Goals

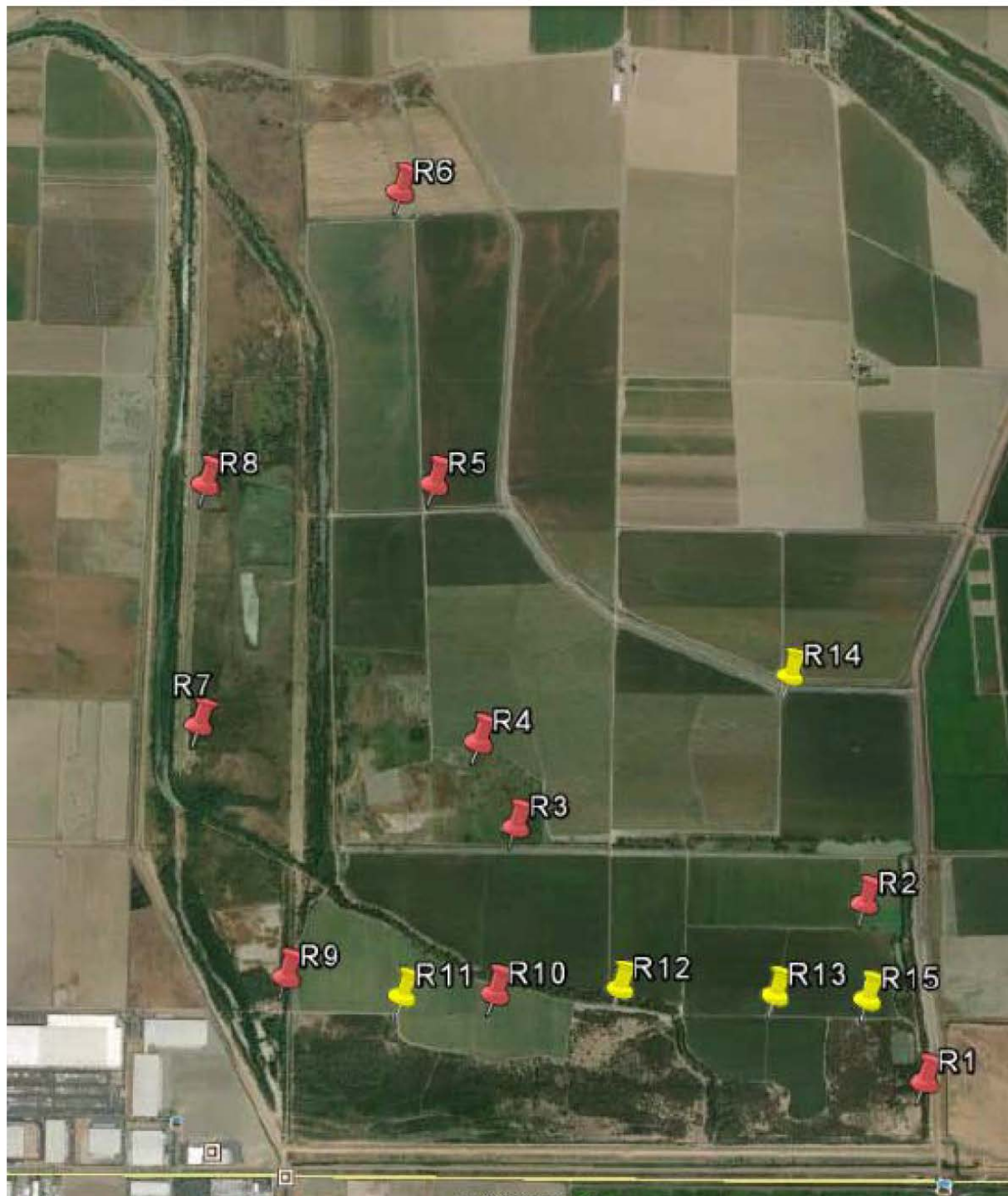
- Provide Data and Interpretive Reports on Mercury and Methylmercury required for future management of the Basin
- RWQCB TMDL Compliance
- USACE O&M Compliance



Mercury Study Objectives

- Primary: In vs. out
 - Determine the concentration of Total, Reactive and Methyl Mercury in water at CCSB inlet/outlet
 - Compute Total and Methyl Mercury loads in/out of CCSB
- Secondary: In-basin processes
 - Sedimentation – Core Samples
 - Geochemical Interactions – Mercury Cycling
 - Biological – Bird & Fish Studies



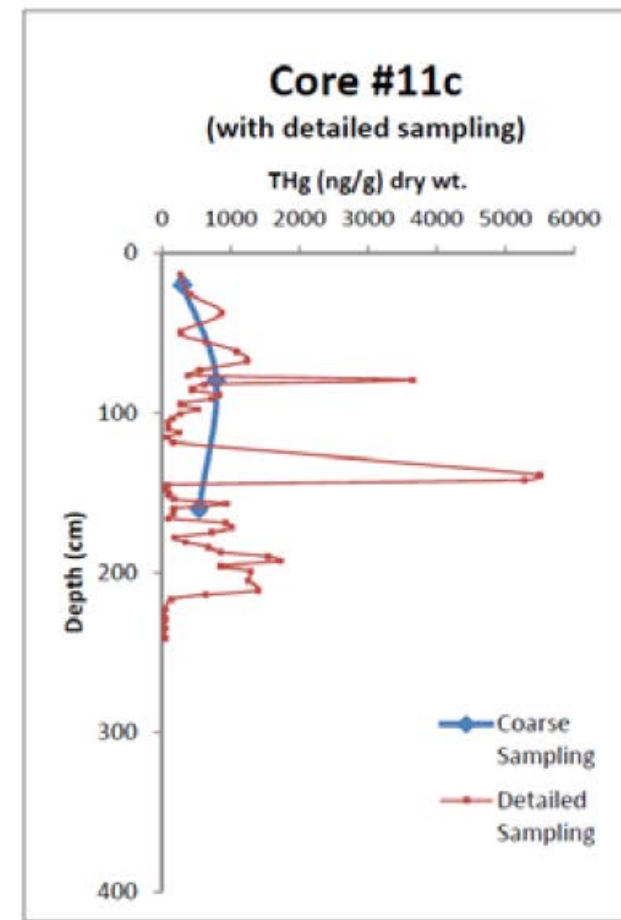
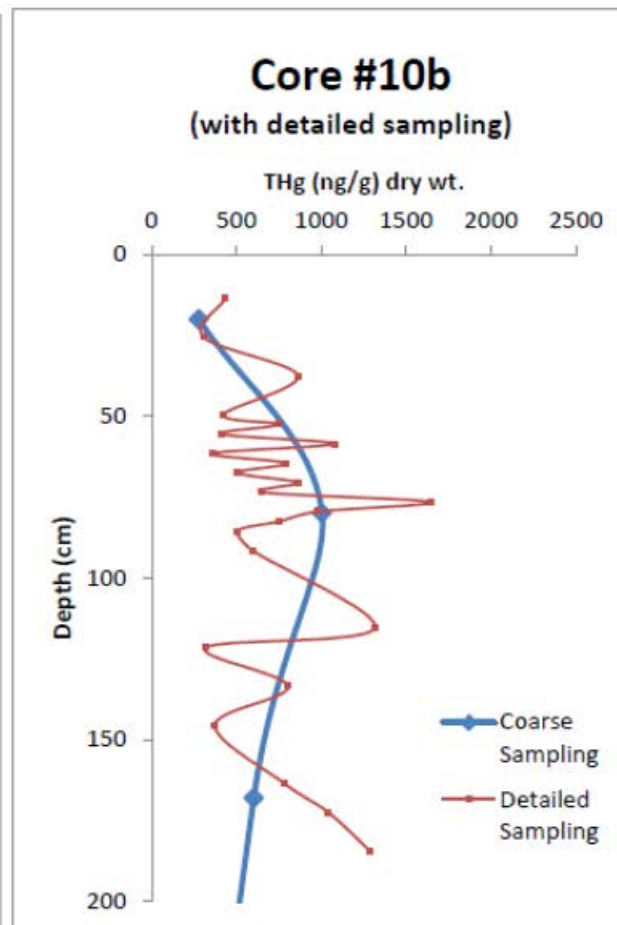
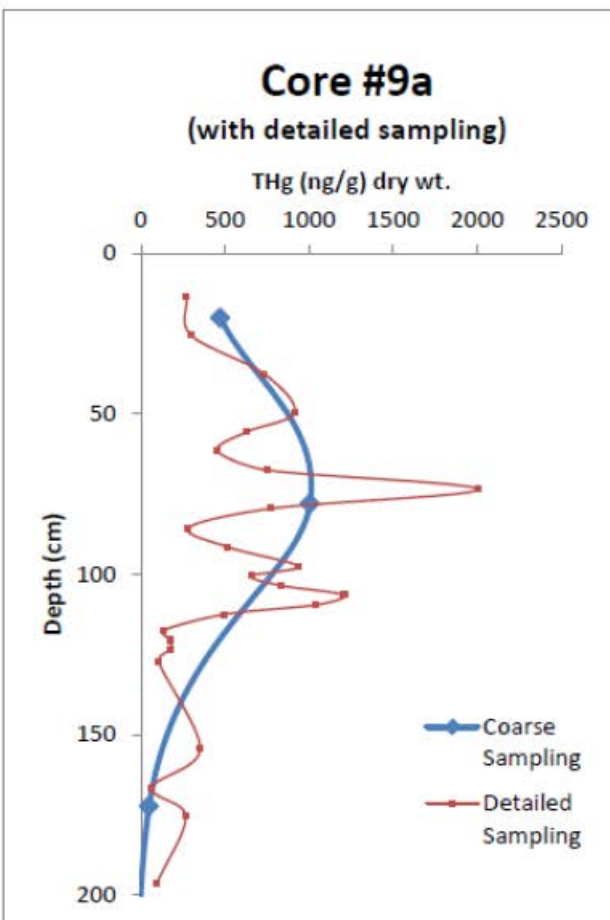


CCSB Drilling sites

Red – 2011 (10 locations)

Yellow – 2012 (5 locations)

Comparison of THg in 20-cm vs. 3-cm intervals



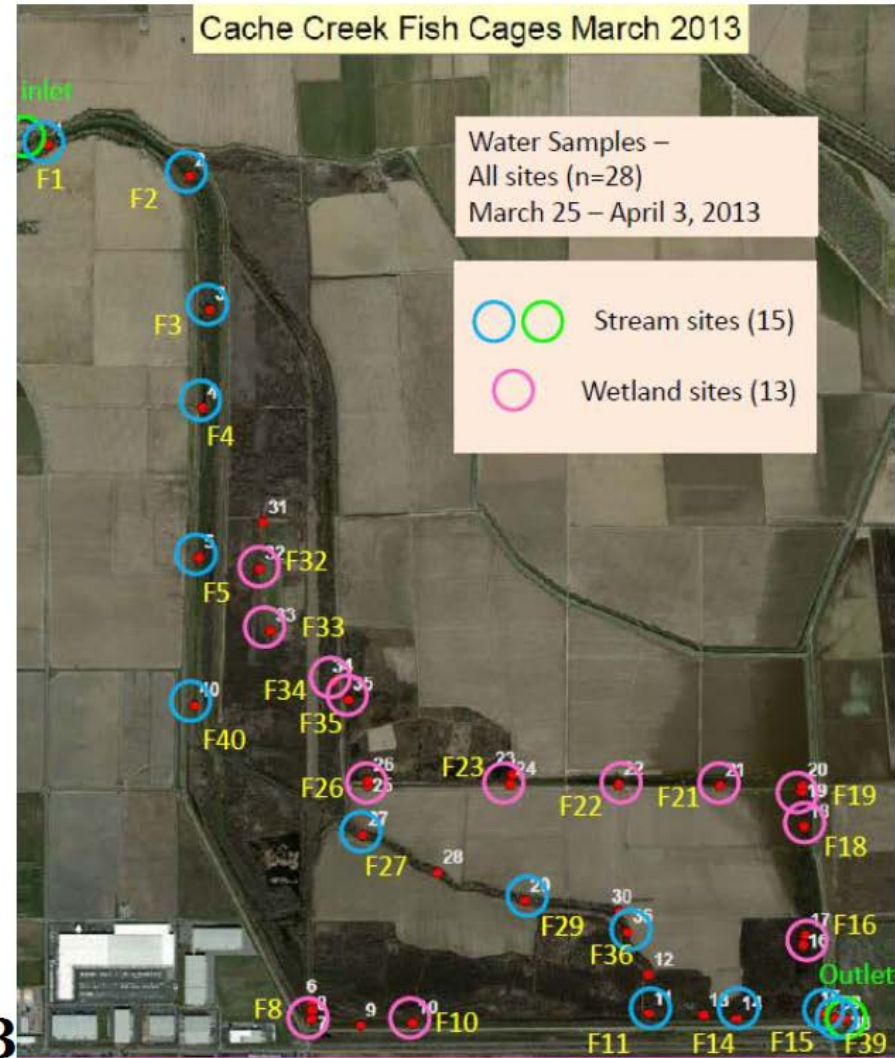
Task c – Water-quality sampling within CCSB

Cache Creek Fish Cages March 2013



A

Cache Creek Fish Cages March 2013



B

Cache Creek Nest Boxes 2012 - 2013 (n=286)



Water Quality of Inflow & Outflows:

Summary of Key Findings

- Trap Efficiency of Total Mercury (particulate) = 70 to 75%
- 38% increase of Methyl Mercury (soluble) load from In to Out
- Core samples show highest concentration of Total Mercury found at approx. 2.5 feet in depth
- Basin captures 99% of sand



Future Milestones

June 2015 – Mercury Characterization Study Technical Report (USGS)

October 2015 – Draft Alternatives Study to the RWQCB

April 2016 – Basin Trap Efficiency Final Report (UCD)

June 2017 – Mercury Characterization Study Final Report (USGS)

January 2018 – USACE required modifications at Year 25

October 2018 – Submit Final Alternatives Study to the RWQCB



O&M

TMDL

Special Studies

Questions?



Summary of Load Calculations

Cache Creek Settling Basin - Summary of Annual Loads, WY 2010-12

calculated by D. Saleh, summarized by C. Alpers

18-Sep-14

	Q	WW-THg	P-THg	F-THg	SS	SS-sand	SS-silt+clay	WW-MeHg	P-MeHg	F-MeHg	P-RHg(II)	DOC	P+F-THg	P+F-MeHg	Sand+silt-clay
units	cfs-days	kg	kg	kg	10 ⁶ kg	10 ⁶ kg	10 ⁶ kg	kg	kg	kg	kg	x 10 ³ kg	kg	kg	kg
Inflow															
WY 2010	83,783	27.0	27.6	0.92	100	6.71	156	0.10	0.17	0.020	0.62	882	28.5	0.19	163
WY 2011	199,046	121	135	2.2	295	55.1	567	0.90	0.50	0.047	1.97	2250	137	0.55	622
WY 2012	15,091	0.7	0.6	0.09	4.3	0.06	1.8	0.02	0.01	0.0035	0.018	128	0.7	0.02	1.9
WY 2013	47,910	19.3	19.1	0.92	128			0.12	0.12	0.011			20.0	0.13	
WY 2014	0	0.0	0.0	0.0	0.0			0.00	0.00	0.000					
WY 2010-2014	345,830	168	182	4.1	528	61.87	725	1.15	0.81	0.082	2.61	3260	186	0.89	787

Combined Outflow

WY 2010	70,294	9.3	5.6	0.78	35	0.13	39.7	0.05	0.11	0.036	0.13	783	6.4	0.14	40
WY 2011	187,874	32.6	36.6	1.9	246	0.51	179	0.40	0.31	0.059	0.48	2040	38.5	0.37	180
WY 2012	9,041	0.4	0.7	0.06	2.0	0.04	1.2	0.03	0.01	0.0039	0.010	93.7	0.7	0.01	1.2
WY 2013	41,924	10.6	8.3	0.78	34			0.07	0.09	0.014			9.1	0.10	
WY 2014	0	0.0	0.0	0.0	0			0.00	0.00	0.000					
WY 2010-2014	309,133	52.9	51.2	3.5	316	0.68	220	0.55	0.51	0.113	0.62	2917	54.7	0.62	221

% trapped

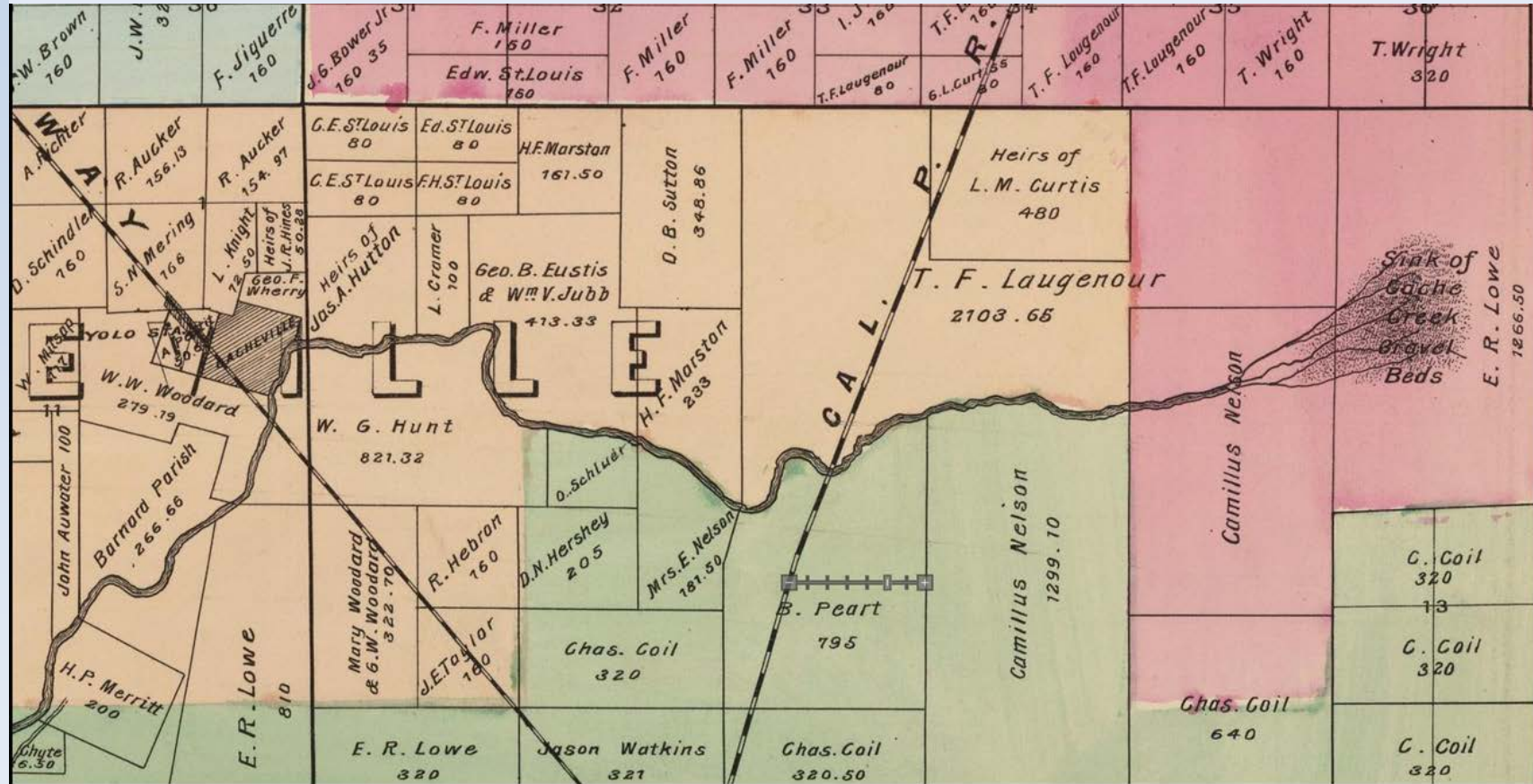
WY 2010	16%	66%	80%	15%	65%	98%	75%	52%	40%	-81%	79%	11%	78%	28%	76%
WY 2011	6%	73%	73%	15%	17%	99%	68%	55%	38%	-26%	76%	9%	72%	33%	71%
WY 2012	40%	43%	-13%	36%	54%	33%	33%	-14%	30%	-13%	44%	27%	-7%	21%	33%
WY 2013	12%	45%	57%	15%	73%			41%	30%	-28%			55%	26%	
WY 2014															
WY 2010-2014	11%	68%	72%	15%	40%	99%	70%	52%	37%	-39%	76%	11%	71%	30%	72%

Trapping efficiency

< 0%	produced
5-20%	trapped
20-40%	trapped
40-60%	trapped
60-70%	trapped
70-85%	trapped
> 98%	trapped

- P-THg, P-RHg(II) trapped 70-80%
- Sand trapped 99%
- F-MeHg only constituent that increases from In to Out
- F-THg and DOC “conservative”, i.e. similar to water balance

Cache Creek “Gravel Beds” 1879



Source: Yolo County APN Map 1879

