Sites Project Water Quality Group Discussion

July 19, 2021

Sites

Agenda

1. Introductions
2. Group Norms
3. Action Item Follow-up
4. Flow Mechanisms
   a) Mixing of Sites water
   b) Colusa Basin Drain flows to Yolo Bypass
   c) Delta flows Key Concepts
5. Mercury/methylmercury
6. Open Topics and Discussion
7. Action Items and Adjourn

Group Norms

- Encourage everyone to be on video
- Mute yourself when others are speaking
- Respectful, professional dialogue
- Ask questions throughout, lets have a dialogue
  - Let the speaker finish their point
  - Use the raise your hand function in Teams if needed
- Topics for next meeting will be discussed and recorded

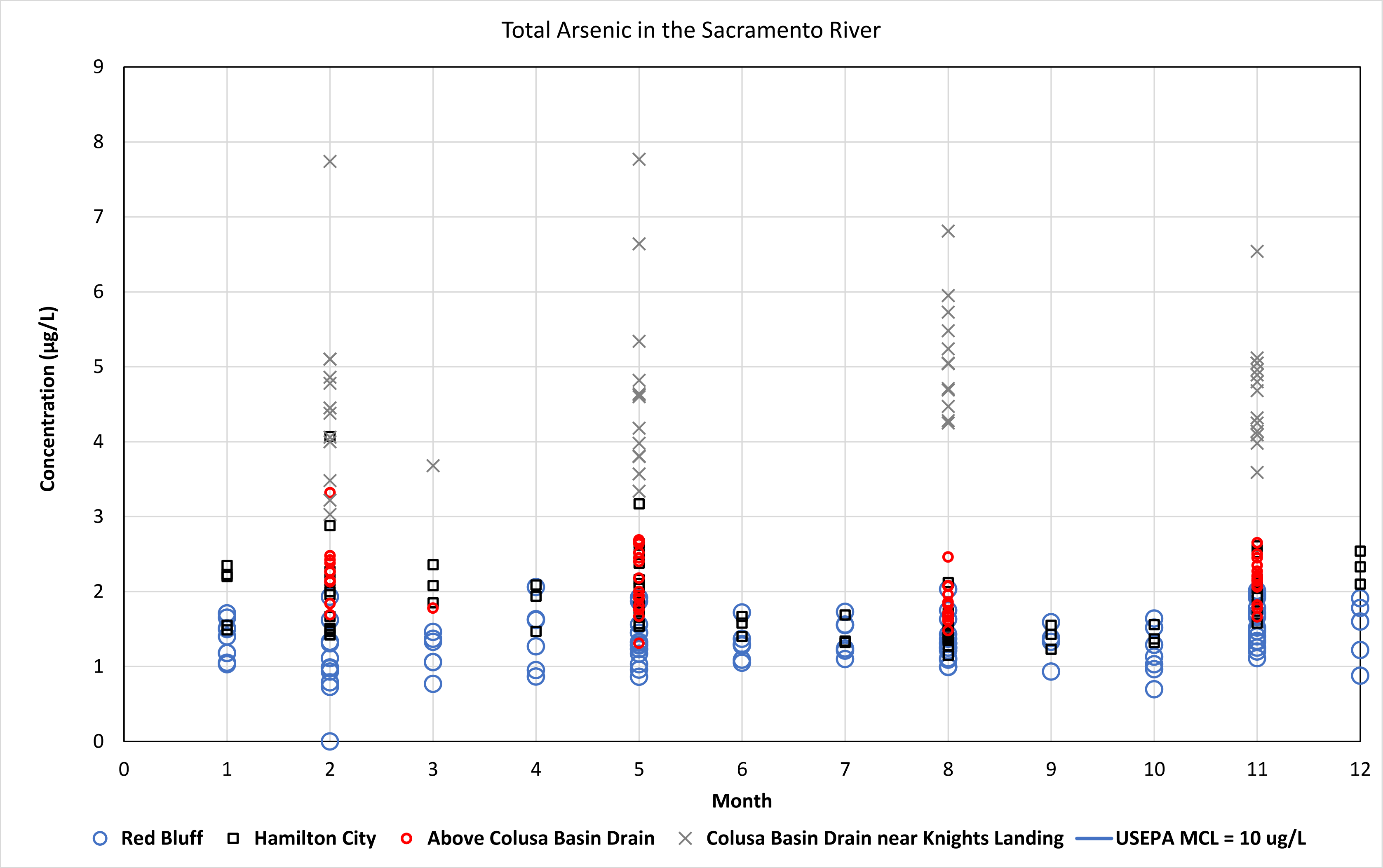
Action Item Follow-up

Action Item	Addressed	Pending	Notes
Specificity on years for data	X		
Distribute metals table	X		
Effects of release temperature on rice	X		
Effects of Hg and As on rice	X		
Effects of reservoir operations on water quality of Stone Corral and Funks creeks.	X		
Anti-degradation policy and Sites	X		
Synergistic effects of chemicals	X		

Flow Mechanisms

Sites

Discharge to Local Agriculture - Arsenic



Discharge to Local Agriculture - Arsenic

Parameter	Arsenic Concentration (µg/L)
Average total arsenic concentration measured in the Sacramento River below Red Bluff and at Hamilton City during January – March (Sites primary period for diversion to storage)	1.59
Estimated average total mercury concentration in Sites Reservoir after evapoconcentration[a]	1.84
Estimated maximum total arsenic concentration in Sites Reservoir after evapoconcentration[b]	2.35
Average measured total arsenic concentration in the Sacramento River above the CBD during May – September (Sites primary period for releases to the Sacramento River)	1.98
Average measured total arsenic concentration in the Sacramento River at Hamilton City during May – September (representing water used by GCID for rice irrigation).	1.71
Average measured total arsenic concentration in the CBD during May – September	4.91
MCL for drinking water	10.0
Dissolved arsenic 4-day average threshold for freshwater aquatic life	150.0
FAO recommended maximum concentration in irrigation water (Ayers and Westcot 1985:96)	100, but noted that toxicity to rice may occur at less than 50.
Arsenic concentration associated with toxicity to rice in Taiwan (Murphy et al. 2018a)	40
Dutch concentration requiring intervention or remediation (Murphy et al. 2018a)	55
For reference purposes: arsenic concentrations measured in Cambodian groundwater used for rice irrigation (Murphy et al. 2018b:4)	Up to 1,200

[a] 16% higher than inflow concentration based on the estimated average percent increases in concentration due to evapoconcentration (13%–16%, depending on alternative).
[b] 48% higher than inflow concentration based on the estimated maximum percent increase in concentration (41%–48%, depending on alternative), which represents one month out of the 984 months simulated by CALSIM.

Estimated Aqueous Methylmercury in Sites Reservoir

Estimated Concentrations of Aqueous Methylmercury in Sites Reservoir Releases

Estimated Methylmercury Concentration	Short-Term (1-10 y after filling) (ng/L)	Long-Term Average (>10 y after filling) (ng/L)
Expected	0.20	0.10
Reasonable Worst-Case	0.30	0.15

- Expected Concentrations
  - Long-term: aqueous methylmercury concentrations calculated by doubling estimated concentrations determined for imports from the Sacramento River (Red Bluff and Hamilton City fractions)
  - Short-term: Twice as high as long-term concentration
- Reasonable Worst-Case Concentrations:
  - "Reasonable worst-case" is not necessarily the maximum concentrations that could occur at Sites but instead is an estimated upper bound of expected average concentration based on published literature and site-specific conditions.
  - Long-term: Maximum measured concentration in Indian Valley Reservoir (2011)
  - Short-term: Twice as high as long-term concentration

Discharge to Colusa Basin Drain-Methylmercury

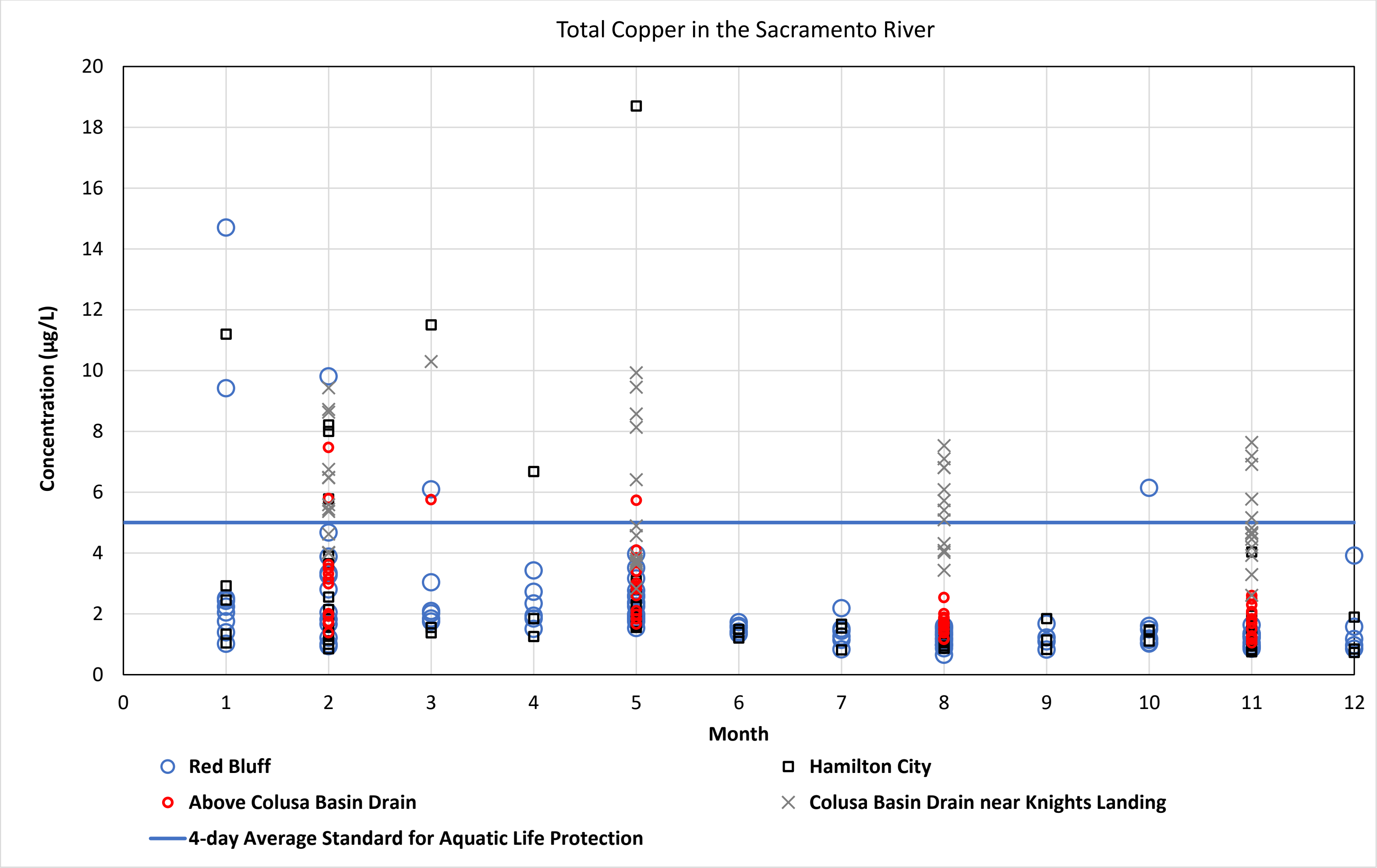
- Generally beneficial to CBD except for methylmercury
- Aqueous Methylmercury: All estimated concentrations in Sites Reservoir releases except expected long-term average (0.10 ng/L) would exceed average baseline concentrations in CBD (0.13 and 0.17 ng/L avg for 2 different data sets)
- Fish Tissue Methylmercury:
  - No long-term increases expected because releases would not occur year-round and the increase in aqueous methylmercury would be low.
  - Under short-term conditions, methylmercury in fish tissue may exceed the CA sport fish tissue objective (0.2 mg/kg, wet weight).

Mercury Mitigation and Management

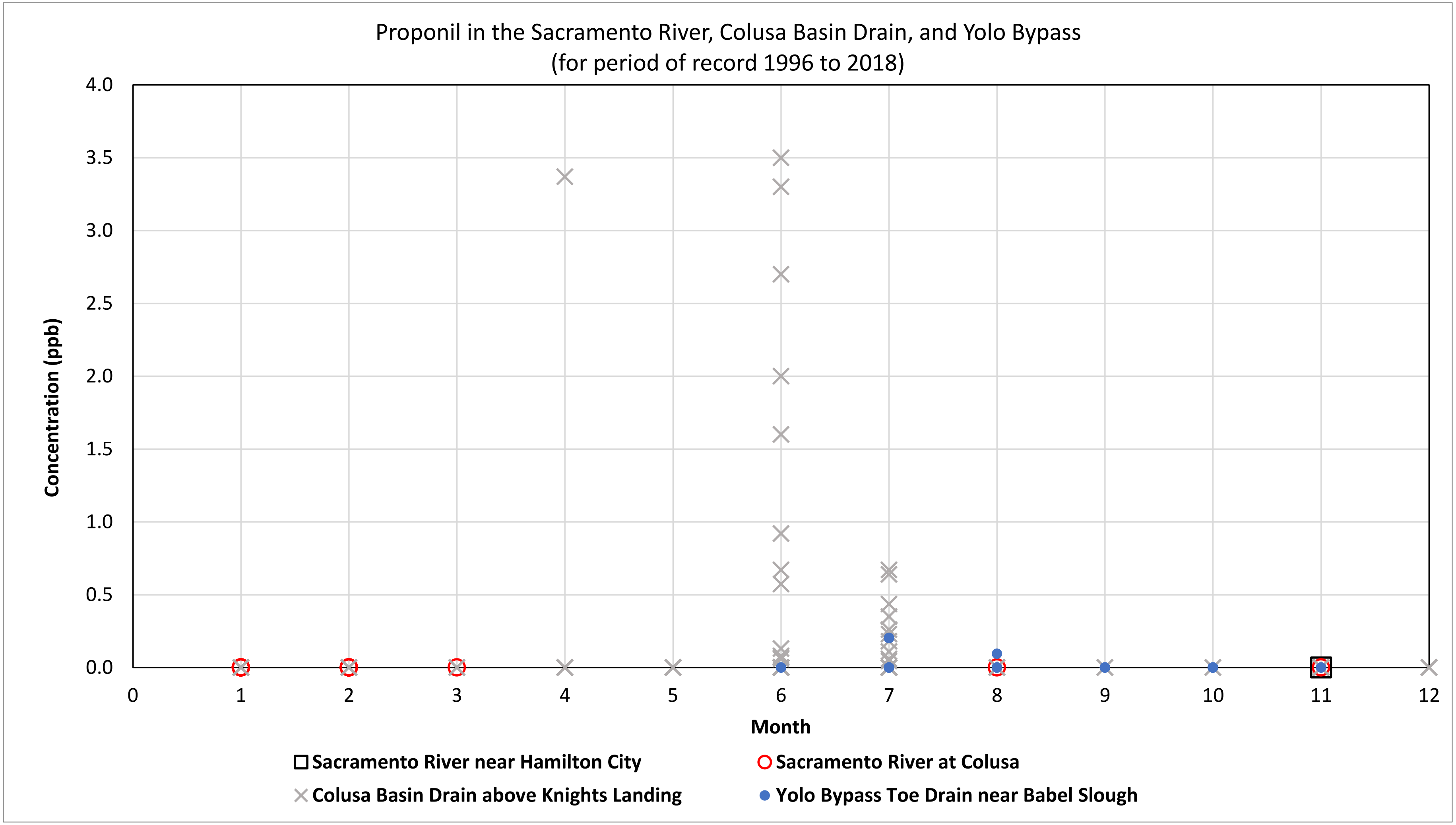
- RMP and Mitigation Measure WQ-1.1
  - Remove vegetation in inundation footprint prior to initial filling
  - Delay fish stocking- approx. 10 years after initial filling
  - Monitor reservoir fish tissue methylmercury
  - Post fish consumption warning signs if fish tissue methylmercury concentrations exceed CA sport fish objective
  - Implement methylmercury reduction actions for new reservoirs as identified in the implementation plan for Statewide Mercury Control Program for Reservoirs[a]

[a] SWRCB. 2017. *Draft Staff Report for Scientific Peer Review for the Amendment to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California, Mercury Reservoir Provisions – Mercury TMDL and Implementation Program for Reservoirs*

Discharge to Colusa Basin Drain-Other Metals



Discharge to Colusa Basin Drain - Pesticides



Discharge to Sacramento River

- Locations
  - Sacramento River at Knights Landing for Alts 1 and 3
  - Dunnigan Pipeline for Alt 2 (near Tyndall Landing)
- Substantial dilution of Sites water in Sacramento River
- Quantitative evaluation for salinity, mercury, and other metals

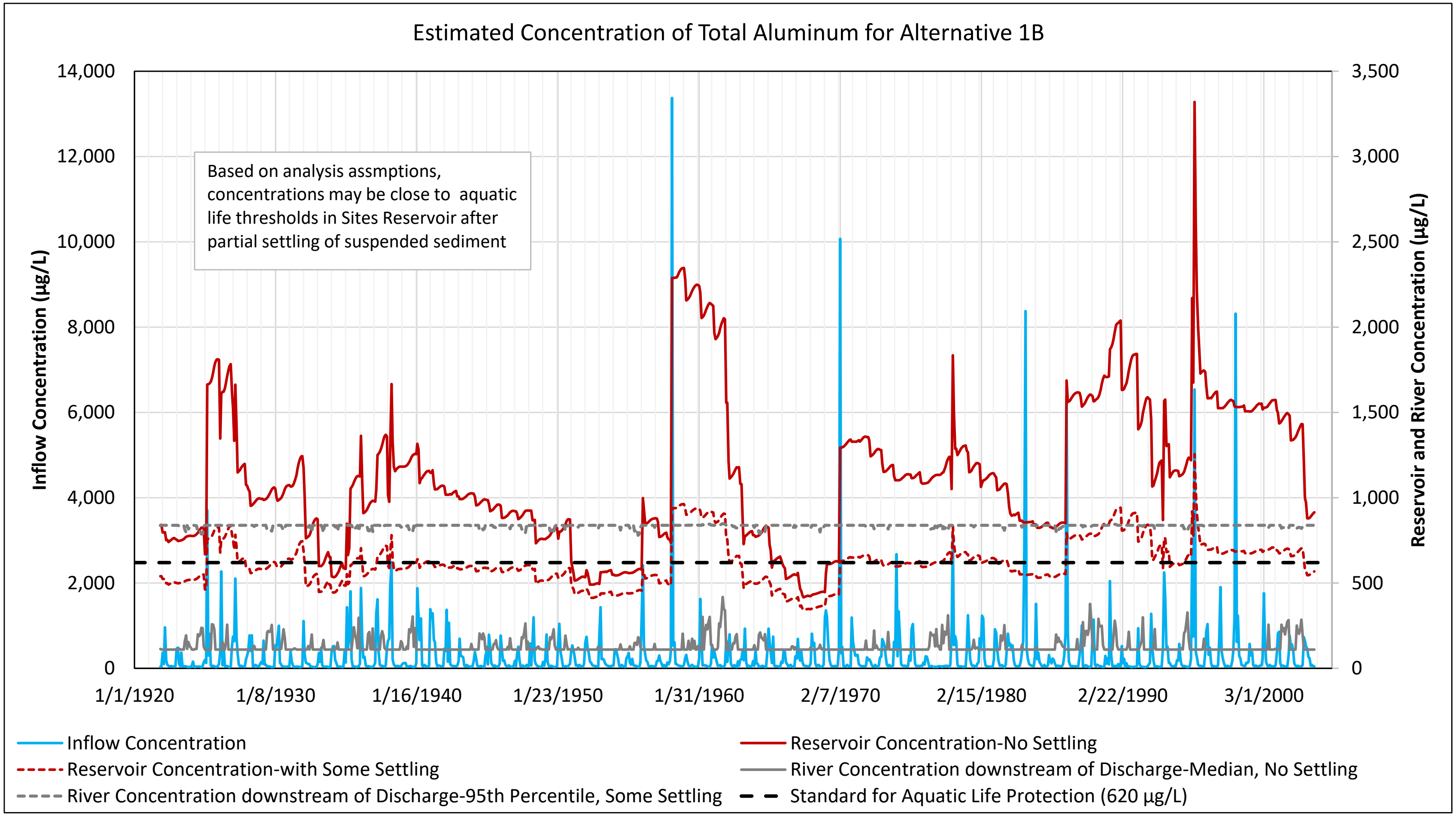
Discharge to Sacramento River-Dilution

- Simulated Sites Reservoir Release to Sacramento River (Release to Dunnigan Pipeline minus Release to Yolo Bypass) for All Alternatives (cfs)

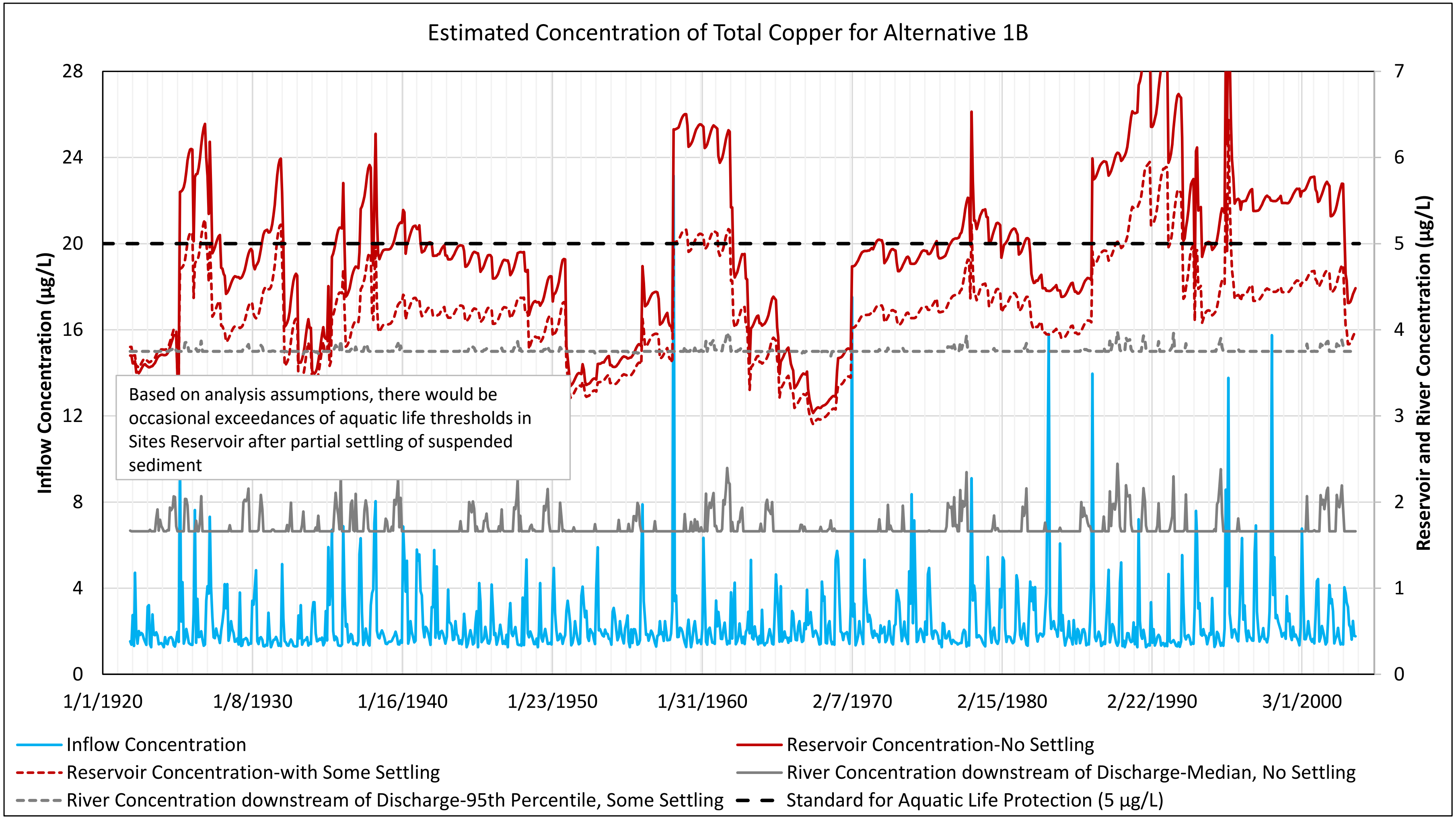
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Average for Critically Dry Water Years												
NAA	0	0	0	0	0	0	0	0	0	0	0	0
Alt 1A	204	99	3	0	0	0	108	432	529	615	416	428
Alt 1B	127	96	10	15	0	13	123	417	520	621	435	373
Alt 2	131	100	3	0	0	0	109	425	497	605	346	319
Alt 3	80	83	10	19	21	78	148	396	464	593	379	179
Average for Dry Water Years												
NAA	0	0	0	0	0	0	0	0	0	0	0	0
Alt 1A	325	364	23	0	0	0	58	111	794	970	609	572
Alt 1B	367	294	31	0	15	15	184	178	765	956	594	538
Alt 2	251	206	26	0	0	0	58	111	750	966	583	487
Alt 3	284	163	12	0	0	38	156	231	656	936	531	443
Average of All Water Year Types												
NAA	0	0	0	0	0	0	0	0	0	0	0	0
Alt 1A	113	130	11	0	0	0	28	88	271	391	276	218
Alt 1B	107	139	43	5	5	7	60	100	314	385	275	191
Alt 2	87	102	13	0	0	0	29	87	257	388	254	184
Alt 3	99	91	39	3	8	21	57	109	307	397	271	147
Average for Wet Water Years												
NAA	0	0	0	0	0	0	0	0	0	0	0	0
Alt 1A	0	17	14	0	0	1	0	0	0	0	0	0
Alt 1B	0	93	102	0	3	6	0	0	0	0	0	0
Alt 2	0	15	17	0	0	1	0	0	0	0	0	0
Alt 3	0	81	102	0	4	5	0	0	0	0	0	0

- When Sites Reservoir would release water to the Sacramento River, it would constitute 6%–7% of the Sacramento River flow on average and 12%–13% when discharges are relatively high compared to river flow (i.e., 90th percentile values), depending on Alternative

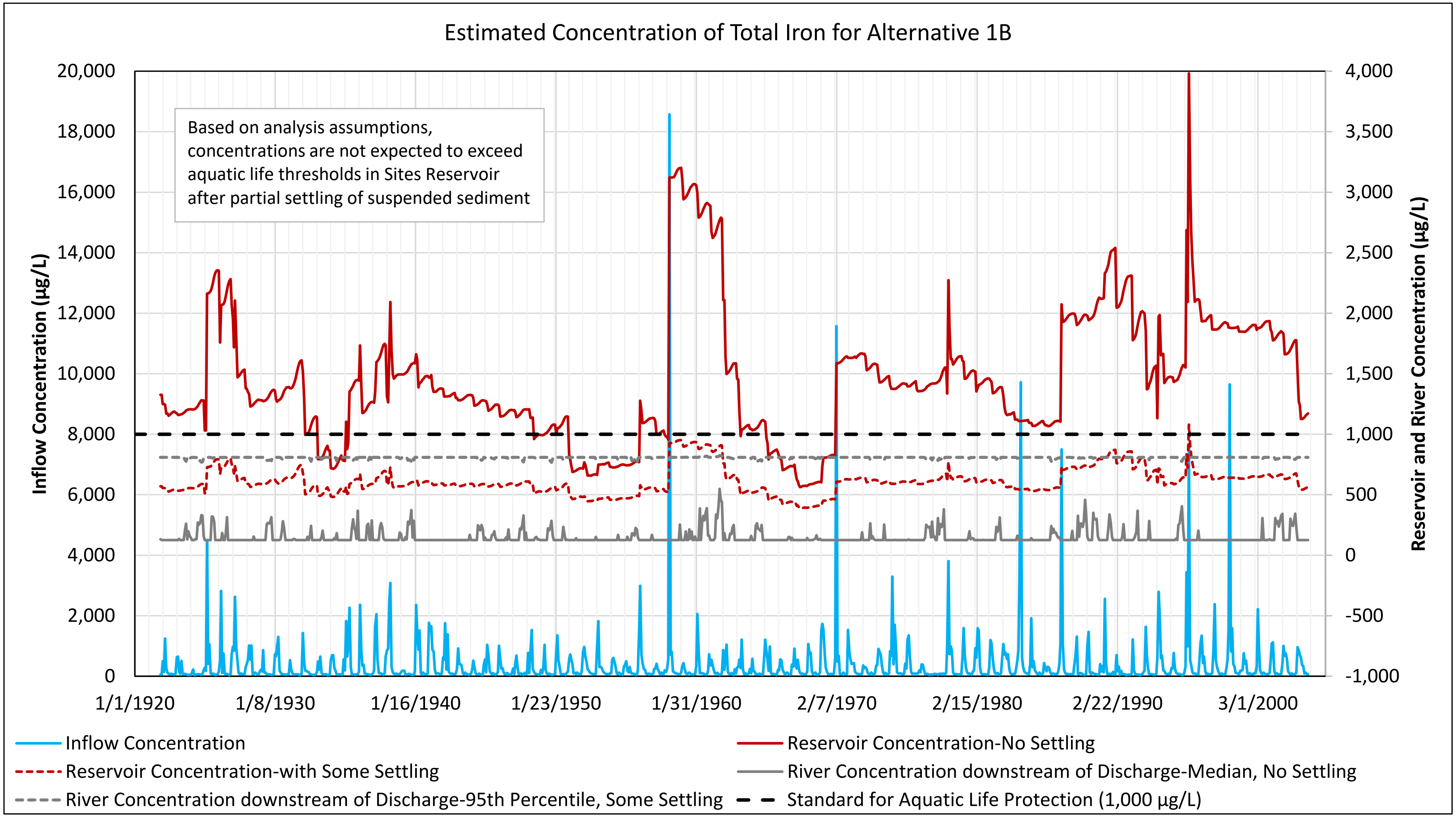
Discharge to Sacramento River-Total Aluminum



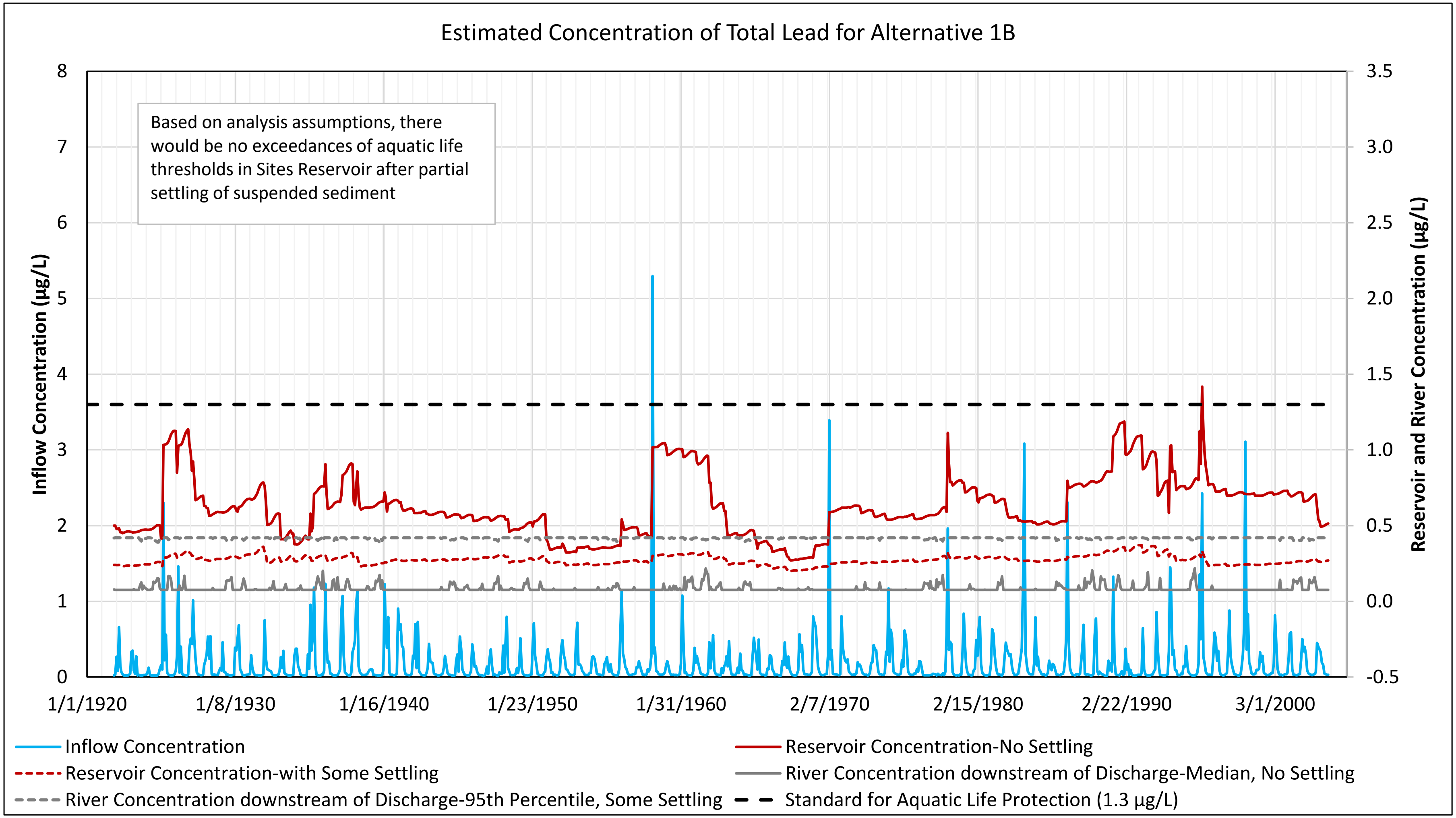
Discharge to Sacramento River- Total Copper



Discharge to Sacramento River- Total Iron



Discharge to Sacramento River- Total Lead



Discharge to Funks and Stone Corral Creeks

- Temperature studies – part of Technical Studies Plan and Adaptive Management for Funks and Stone Corral Creeks – for fish

- Stone Corral Creek – discharge from bottom of Sites Dam

- Funks Creek – discharge from I/O Tower

Discharge to Funks and Stone Corral Creeks-Methylmercury

- Total mercury concentrations in Sites Reservoir releases > Funks and Stone Corral Creeks
  - Sites Reservoir
    - Estimated short-term total mercury: 3.8 – 4.5 ng/L
    - Estimated long-term total mercury: 1.9 – 2.3 ng/L
  - Funks and Stone Corral Creeks total mercury: 0.35 ng/L and 0.85 ng/L, respectively
- Because most of the flow in Funks and Stone Corral Creeks would originate from Sites Reservoir releases, mercury and methylmercury concentrations in these creeks would increase and this would be reflected in fish tissue.
  - Effect greater in short term vs. long term
  - Effect may be larger for Stone Corral because releases would be made from lower in the reservoir where oxygen would be lower and methylmercury may be higher

Discharge to Stone Corral Creeks – Metals Impact

- Potentially significant during dry season due to bottom release from Sites Reservoir
- Mitigation Measure WQ-2.1 – possible actions:
  - Monitor metal concentrations to assess effect
  - Evaluate effect of modifying releases to Stone Corral Creek
  - Add vertical extension to reservoir at the withdrawal point
  - Pump water from the top of Sites Reservoir

Discharge into Yolo Bypass – Habitat Flows

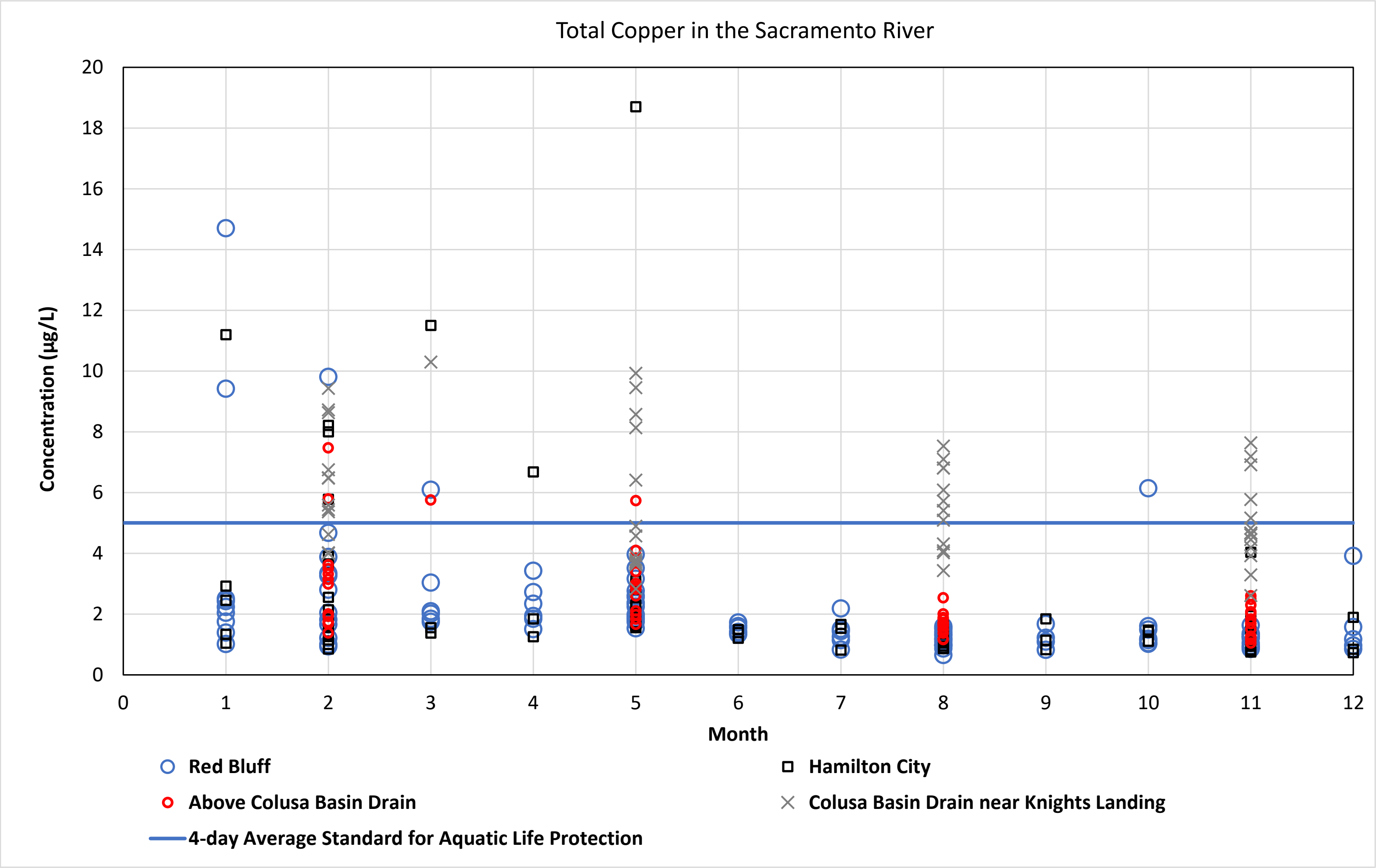
Simulated Sites Reservoir Release to Yolo Bypass for All Alternatives (cfs)

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Average for Critically Dry Water Years												
NAA	0	0	0	0	0	0	0	0	0	0	0	0
Alt 1A	37	0	0	0	0	0	0	0	0	0	123	61
Alt 1B	54	0	0	0	0	0	0	0	0	0	103	77
Alt 2	37	0	0	0	0	0	0	0	0	0	150	37
Alt 3	37	0	0	0	0	0	0	0	0	0	37	39
Average for Wet Water Years												
NAA	0	0	0	0	0	0	0	0	0	0	0	0
Alt 1A	286	0	0	0	0	0	0	0	0	0	356	404
Alt 1B	284	0	0	0	0	0	0	0	0	0	356	391
Alt 2	272	0	0	0	0	0	0	0	0	0	356	437
Alt 3	239	0	0	0	0	0	0	0	0	0	356	382

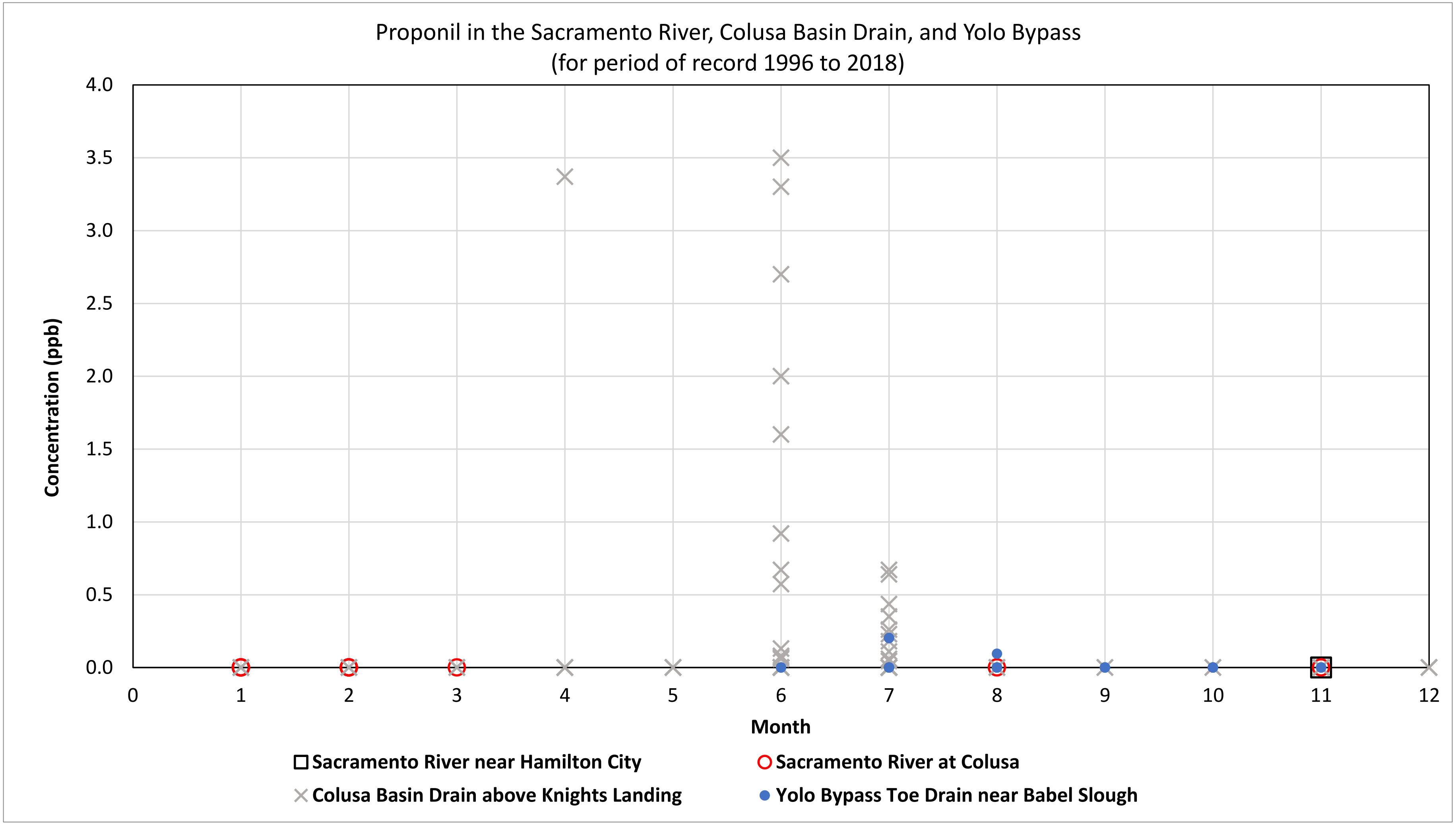
Discharge into Yolo Bypass - Methylmercury

- Yolo Bypass Floodplain Inundation
  - Winter flows not expected to result in increase
  - Habitat flows (August - October) zero to minimal increase
- Concentrations in Sites Reservoir releases would be lower than average concentration in Yolo Bypass (0.35 ng/L)

Discharge into Yolo Bypass-Other Metals



Discharge into Yolo Bypass - Pesticides



Discharge into Yolo Bypass – Metals and Pesticides Impact

- Potentially significant metal and pesticide impacts due to input from CBD
- Mitigation Measure WQ-2.2
  - Monitor metal concentrations to assess effect
  - Effect of pesticides already being evaluated as part of North Delta Flow Action studies
  - Multiagency evaluation of net benefit to aquatic communities
  - Find other use for habitat flows if no net benefit

Delta - Salinity

- Simulated Delta Outflow: No Action Alternative (cfs) and % Change between No Action and Project Alternatives

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Average for Critically Dry Water Years												
NAA	4,083	3,905	8,495	10,608	13,663	11,103	9,539	5,682	5,371	4,019	3,375	3,110
Alt 1A	24	-8	-5	-2	-2	-2	0	-1	0	1	5	0
Alt 1B	22	-6	-5	-2	-1	-3	0	-1	0	1	5	1
Alt 2	22	-7	-4	-2	-1	-3	0	-1	0	1	5	0
Alt 3	17	-4	-5	-2	-3	-2	0	-2	0	1	2	-1
Average for Wet Water Years												
NAA	7,958	11,658	26,283	85,174	99,942	80,070	54,824	37,979	23,391	11,761	7,207	12,538
Alt 1A	2	-3	0	-2	-1	-1	-2	-1	-1	0	3	2
Alt 1B	2	-3	0	-2	-2	-1	-2	-1	-1	0	3	3
Alt 2	2	-3	0	-1	-1	-1	-1	-1	-1	0	4	3
Alt 3	2	-3	0	-1	-1	-2	-2	-1	-1	0	3	2

- X2: No Action Alternative (km) and Change between No Action and Project Alternatives

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Average for Critically Dry Water Years												
NAA	92.9	92.4	87.6	83.5	77.2	76.7	79.0	84.1	87.2	89.6	91.5	93.0
Alt 1A	-1.3	-0.7	0.4	0.3	0.4	0.5	0.1	0.1	0.0	-0.3	-0.5	-0.5
Alt 1B	-1.2	-0.7	0.4	0.3	0.3	0.4	0.1	0.1	0.1	-0.3	-0.5	-0.6
Alt 2	-1.2	-0.6	0.4	0.3	0.3	0.4	0.1	0.1	0.1	-0.3	-0.5	-0.4
Alt 3	-0.8	-0.6	0.4	0.3	0.4	0.4	0.1	0.1	0.1	-0.2	-0.4	-0.3
Wet Water Years												
NAA	78.7	79.5	75.3	57.5	54.8	55.5	56.7	59.3	65.4	73.6	81.0	78.4
Alt 1A	-0.3	0.1	0.3	0.1	0.0	0.1	0.0	0.0	0.1	0.1	-0.1	-0.3
Alt 1B	-0.3	0.2	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.1	-0.1	-0.3
Alt 2	-0.3	0.2	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.1	-0.2	-0.4
Alt 3	-0.3	0.2	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.1	-0.1	-0.3

Delta - Methylmercury

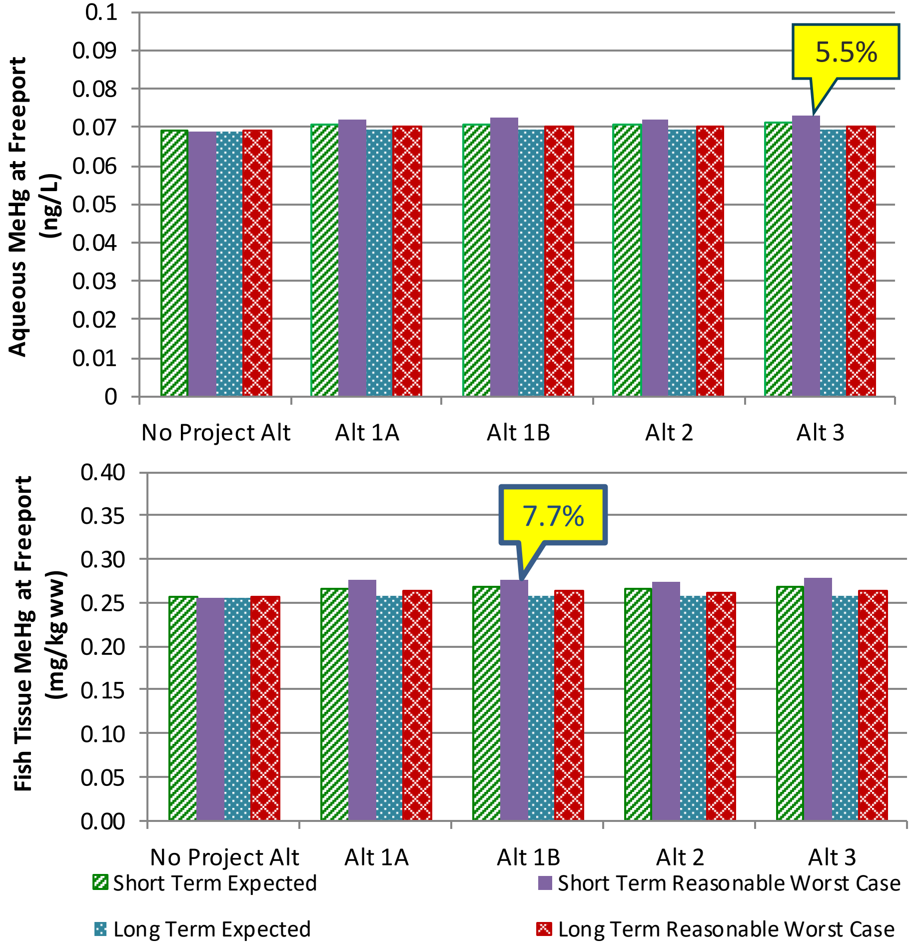
- **Baseline** Aqueous and Fish Tissue Methylmercury at Freeport:
  - Historical average concentration in Sacramento River at Freeport: 0.069 ng/L
  - Calculated baseline concentration at Freeport: 0.26 mg/kg, ww (above Delta TMDL objective of 0.24 mg/kg, ww)

- **Sites Reservoir Project**--Estimated **Average** Aqueous and Fish Tissue Methylmercury at Freeport
  - Estimated average aqueous methylmercury concentration at Freeport with Sites Releases: ≤ 0.072 ng/L (<5% increase above baseline)
  - Modeled[a] average fish tissue methylmercury concentration (based on 0.072 ng/L aqueous): 0.28 mg/kg, ww (7.7% increase above calculated baseline)

- **Sites Reservoir Project**--Estimated **Dry/Critical Water Years** Aqueous and Fish Tissue Methylmercury at Freeport
  - Estimated increase aqueous methylmercury concentration relative to baseline: 0.071 – 0.088 ng/L (3% - 28% increase above baseline)
  - Percent increase modeled average fish tissue methylmercury concentration relative to baseline: 5% - 50%

[a] Central Valley Water Board TMDL Model

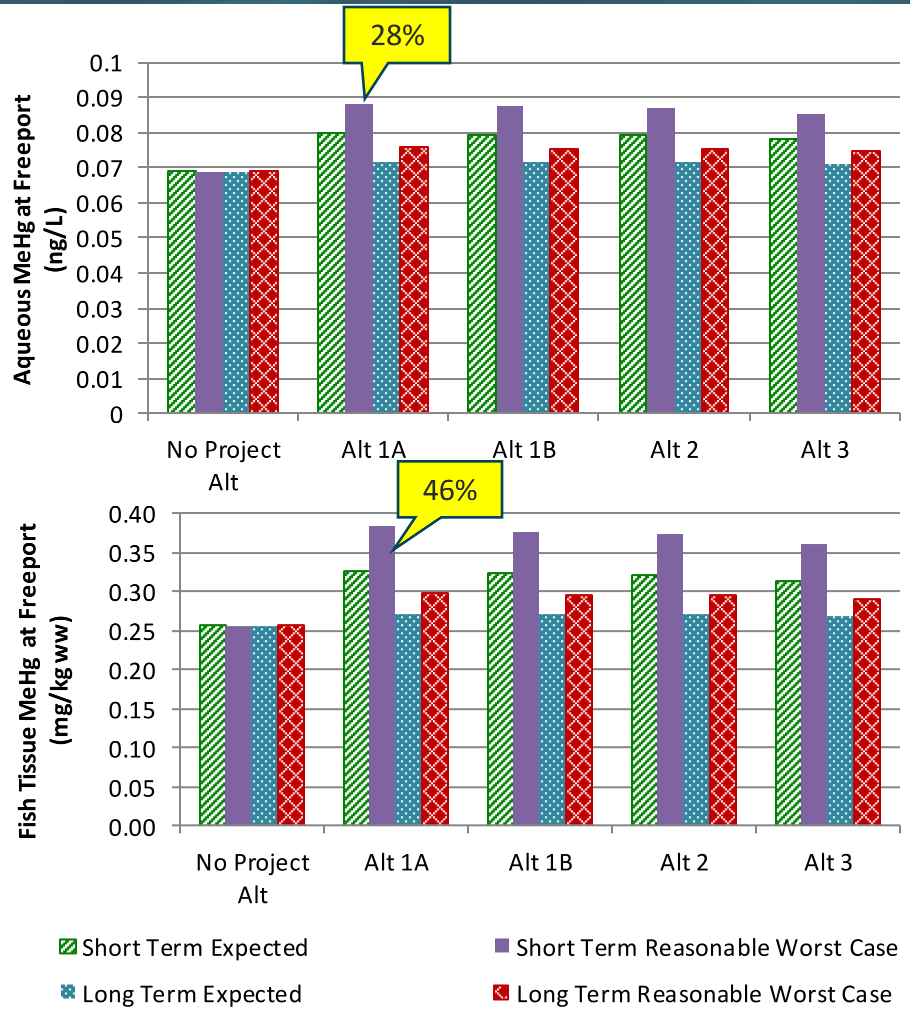
Delta – Estimated Methylmercury Annual Average Flows



Long-Term Expected
<1% increase

Long-Term Expected
<1% increase

Delta – Estimated Methylmercury Dry and Critical Water Years (mean monthly flows in Jul – Nov)



Long-Term Expected
<4% increase

Long-Term Expected
<4% increase

Questions?

Thank you!

Sites

In-Lake Analyses

Reservoir Management Plan

- Part of the Project
- Purpose: describe the management of water resources in Sites Reservoir
  - Water Quality: describe metrics, standards, testing and monitoring protocols, and outcomes
- Constituents currently included:
  - HABs
  - Methylmercury
  - Metals
  - Water Temperature
  - Salt and Minerals (Salt Pond)

Discharge to Funks and Stone Corral Creeks-Methylmercury

<u>Review of Reservoir Concentrations</u>

- Long-term (~10 years after initial filling)
  - Comparable to existing reservoirs
  - 1.9 to 2.3 ng/L total mercury
  - 0.10 to 0.15 methylmercury
- Short-term (up to ~10 years after initial filling)
  - Conditions are conducive to mercury methylation
  - 3.8 to 4.5 ng/L total mercury
  - 0.2 to 0.3 ng/L methylmercury
- Total mercury concentrations would not exceed California Toxics Rule Objective (50 ng/L)
- Tissue concentrations among other reservoirs > CA sport fish objective (0.2 mg/kg ww in 350 mm largemouth bass)

Temperature Model: CE QUAL W2

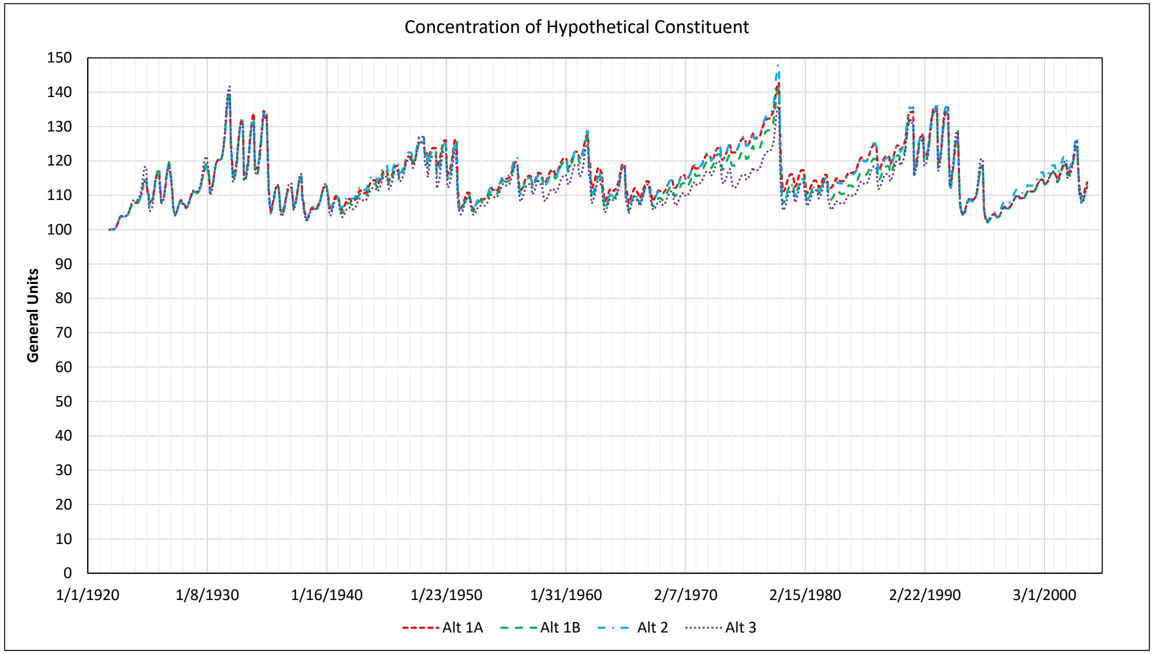
- CE QUAL W2
  - 2D Reservoir Temperature Model
  - Daily timestep
  - Version 4.1
- Assumptions:
  - Reservoir size
  - Estimates surface area with storage volume
  - Considers I/O Tower

Temperature Model: CE QUAL W2

- Inputs
  - Daily flows from operations model (USRDOM)
  - Daily temperature from Sacramento River temperature model (HEC5Q)
  - Daily net evaporation rate (consistent with CalSim II)
- Outputs
  - Surface water temperature
  - Release temperature

Evapoconcentration

- Calculations using water balance information from CALSIM
- Increase in concentration limited by freshening due to release and refilling
- Most relevant to conservative constituents
- Average concentration approximately 13-16 percent higher than the inflow concentration
- Maximum of 41 – 48 percent depending on alternative



Mercury

- Approach
  - Input sources
  - Transformation processes
  - Comparison with similar/nearby reservoirs
    - Concentrations in surface waters and in fish tissues
    - Annual reservoir water level fluctuation
- Key Data Sources
  - California Environmental Data Exchange Network (CEDEN)
  - DWR Water Data Library
  - SWRCB 2017 – Reservoir TMDL draft staff report

Mercury

- Long-term (~10 years after initial filling)
  - Comparable to existing reservoirs
  - 1.6 to 1.9 ng/L total mercury
  - 0.10 to 0.15 methylmercury
- Short-term (up to ~10 years after initial filling)
  - Conditions are conducive to mercury methylation
  - 3.2 to 3.8 ng/L total mercury
  - 0.2 to 0.3 ng/L methylmercury
- Total mercury concentrations would not exceed California Toxics Rule Objective (50 ng/L)
- Tissue concentrations among other reservoirs > CA sport fish objective (0.2 mg/kg ww in 350 mm largemouth bass)

Mercury

- Reservoir Management Plan
  - Remove vegetation in inundation footprint prior to initial filling
  - Monitor reservoir fish tissue methylmercury
  - Post fish consumption warning signs if fish tissue methylmercury concentrations exceed CA sport fish objective
  - Adhere to the State Water Board TMDL for mercury in reservoirs, once adopted

Metals

- Calculations include:
  - Improved estimation of inflow concentration (based on both flow at Keswick and Keswick/Bend Bridge)
  - Evapoconcentration
  - With and without settling of suspended sediment
- Reservoir Management Plan
  - Monitor concentrations of aluminum, copper, iron, and lead upstream of, in, and downstream of Sites Reservoir

HABs

- HABs occur in many reservoirs including Black Butte
- Sufficient nutrients and higher water temperatures (≥66 °F) in Sites Reservoir in May through September could create conditions conducive to formation and maintenance of HABs
- Reservoir Management Plan
  - Monitor for presence of HABs and, if found, cyanotoxins. Add warning signage if warranted
  - Coordinate with Water Board
  - Operate inlet/outlet tower to reduce likelihood of cyanotoxins in release

Other Topics: Salt Pond

- Salt Pond Information
  - August 1997 – dry
  - September 1997 EC = 194,100 µS/cm
  - January 1998 EC = 7,200 µS/cm
  - Estimated flow = 0.1 cfs based on pond size and evaporation rate for region

Other Topics: Salt Pond

- Salt Pond Evaluation:
  - Not expected to have substantial water quality effects
  - Conservatively assumed no decrease in spring discharge
  - Fate of spring discharge:
    - Full mixing of 0.1 cfs for a year into a volume of 200 TAF would represent 0.04 percent of the total volume (EC increase from 130 µS/cm to between 133 – 208 µS/cm)
    - Accumulation at bottom of reservoir due to higher density (74 years to reach low-level intake)
- Reservoir Management Plan
  - Measure EC in springs before construction
  - Measure EC in reservoir after inundation

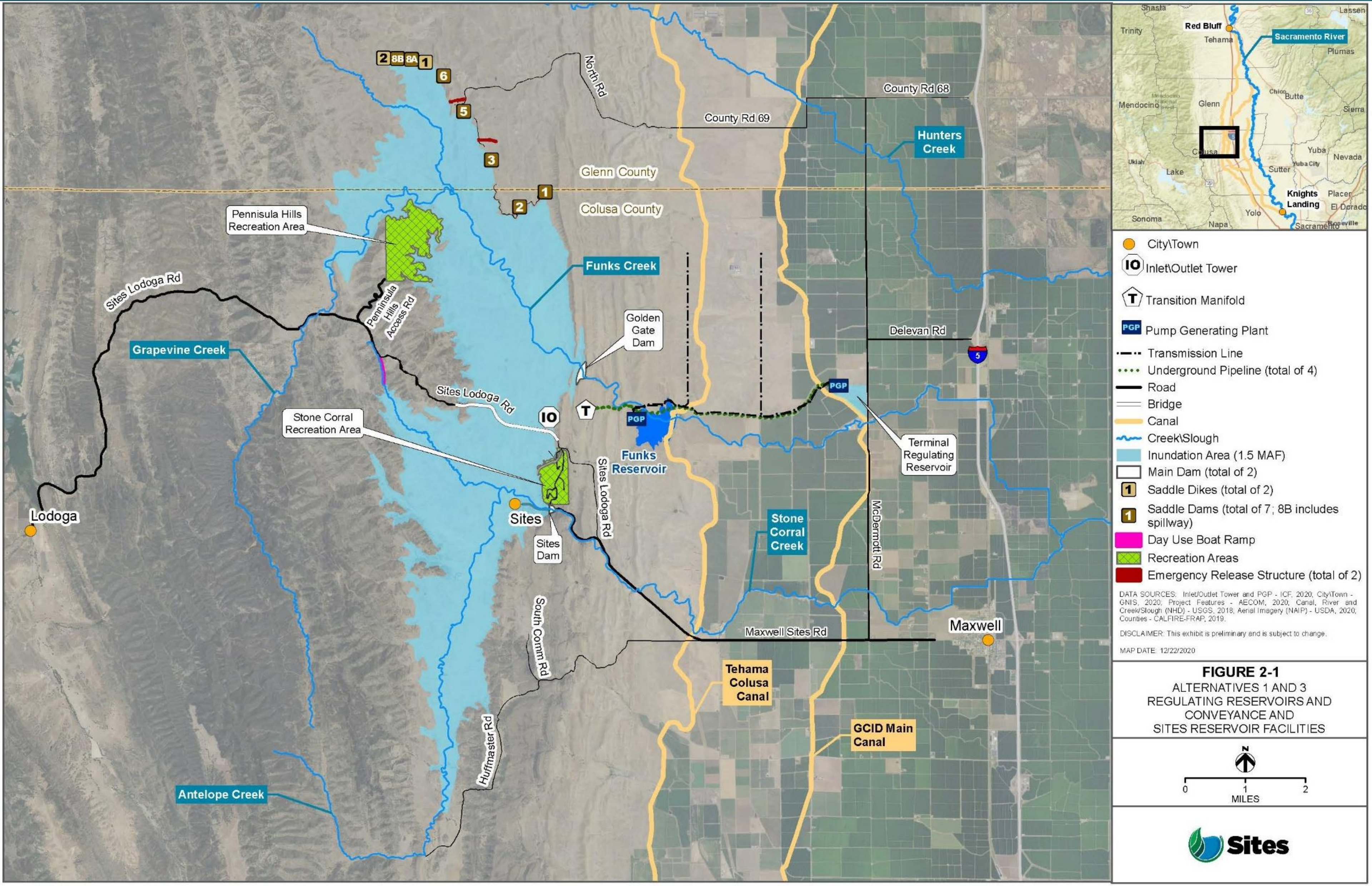
Other Topics Metals and Erosion

- Metal Leaching from Groundwater
  - Reservoir water expected to seep into ground
  - Groundwater does not have elevated metal concentrations
- Reservoir Bank Erosion
  - Temporary increase in turbidity common to many waterbodies
  - Activities in the reservoir footprint (ranching) unlikely to contaminate soil

Method Analysis Overview

Mechanisms by which Sites Reservoir Operations Could Affect Water Quality	Main Constituents Considered	Qualitative	Quantitative	Model Results Considered
Temporal Shift	Metals Pesticides Salinity	X	X	CalSim
Evapoconcentration	Metals Salinity		X	CalSim
In-Reservoir Processes	Mercury HABs Nutrients/OC/DO Temperature	X	X	Reservoir temperature modeling (CE QUAL W2)
Change in System Reservoir Operations	Temperature HABs Mercury	X	X	CalSim, HEC5Q and Reclamation temperature model
Change in Delta Operations	Salinity Chloride	X	X	CalSim and DSM2 QUAL
Redirection of CBD Flow to Yolo Bypass	Pesticides Nutrients/OC/DO HABs Mercury Temperature	X	X	CalSim

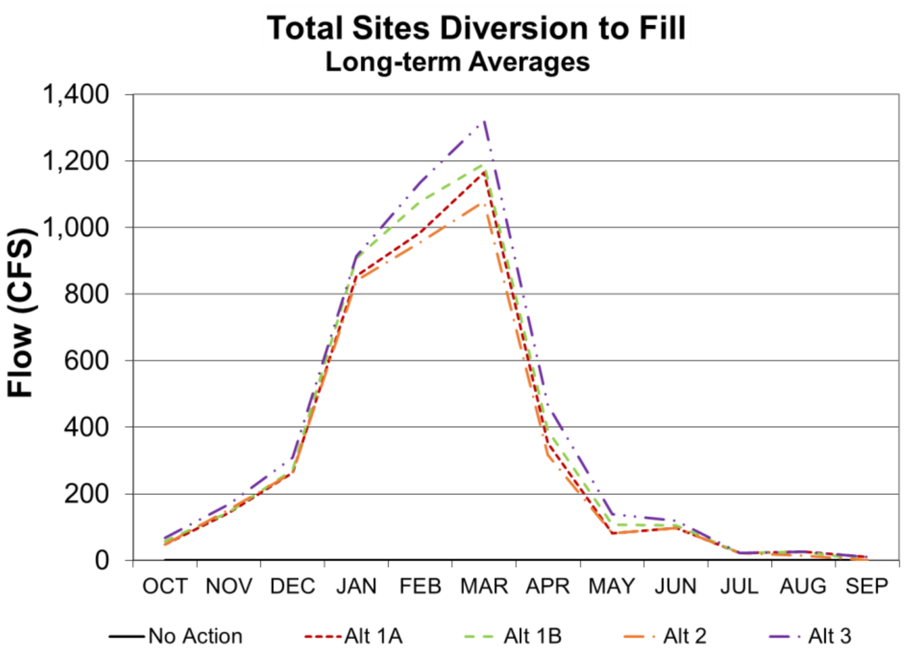
Alt 1 – Preferred Project

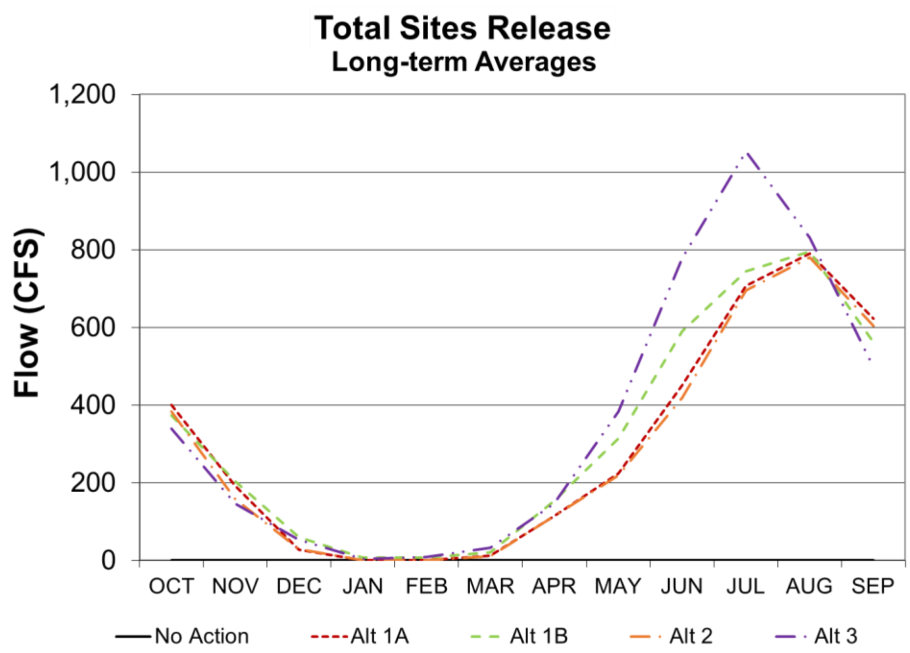


Total Mercury Concentrations (ug/L)

Location	Station	n	Mean Concentration	Maximum Concentration	75th Percentile	Data Range (years)	Source
Funks Creek	Golden Gate	2	0.35	1.2	0.93	2006-2007	DWR Data Library
Stone Coral Creek	-	3	0.85	2.3	1.61	2007	DWR Data Library
Colusa Basin Drain	Knights Landing	26	8.6	19.3	10.8	1996-1998	USGS 2000
Colusa Basin Drain	Knights Landing	66	4.5	75	5.9	1999-2007	CEDEN
Sacramento River	Red Bluff	66	1.3	14.4	1.6	1999-2007	CEDEN
Sacramento River	Hamilton City	66	2.2	54	2.6	1999-2016	CEDEN
Sacramento River	Freeport	217	4.5	89	8.8	1994-2015	CEDEN
Yolo Bypass	Prospect Slough	28	73.2	696	-	1995-2003	Central Valley RWQCB 2010

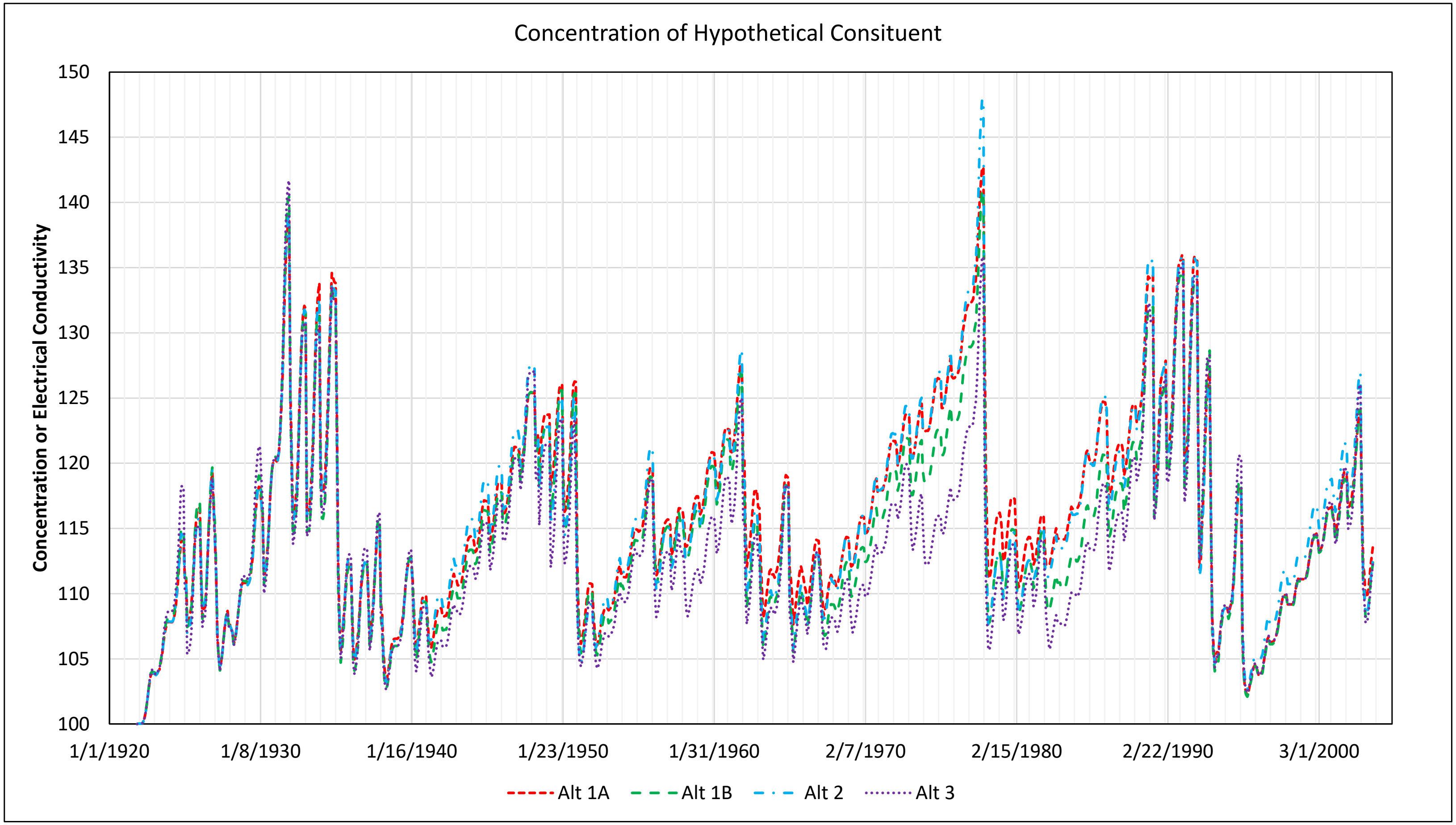
Diversions and Releases



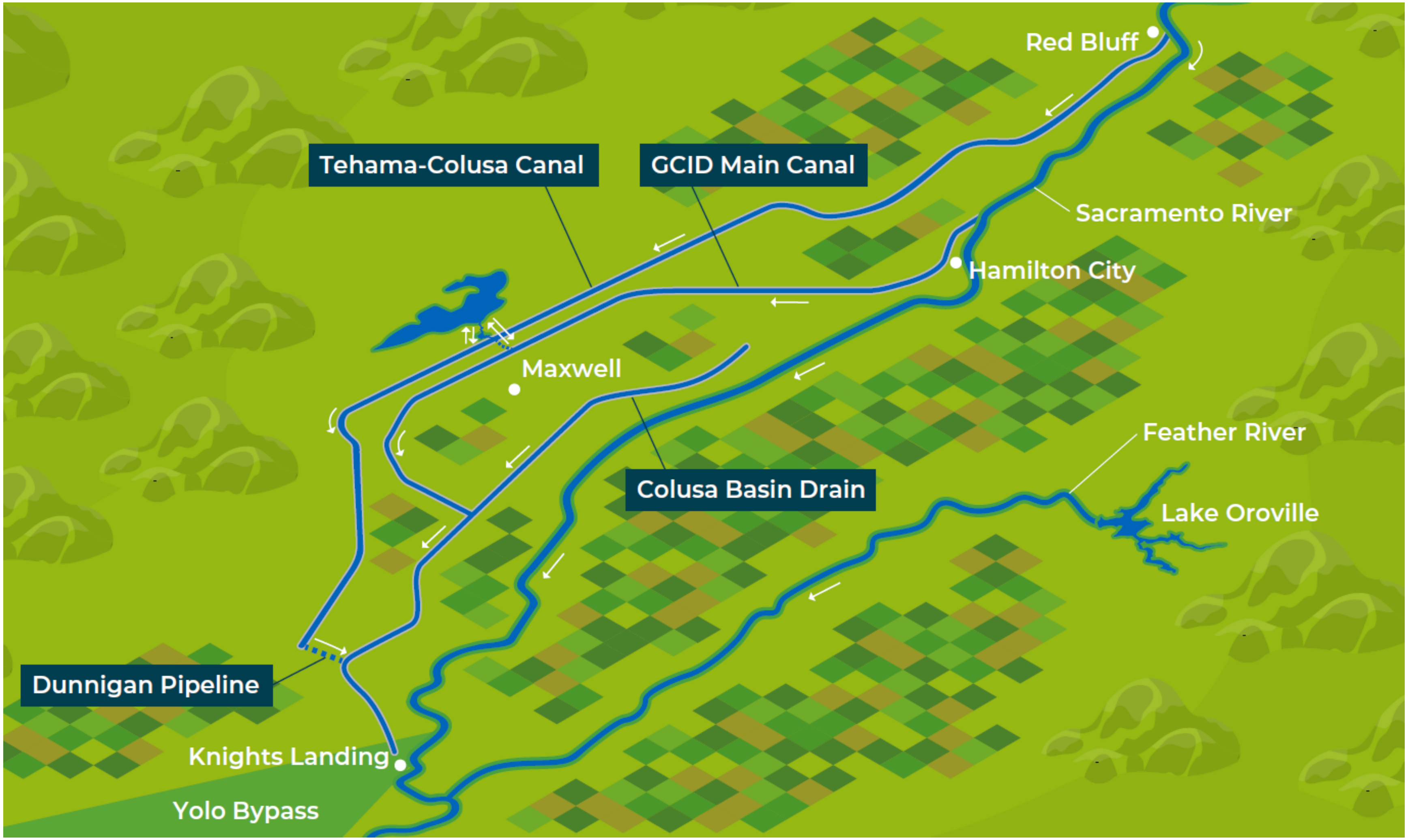


Evapoconcentration

- Calculations using water balance information from CALSIM



Project Water Operations



Main Data Sources

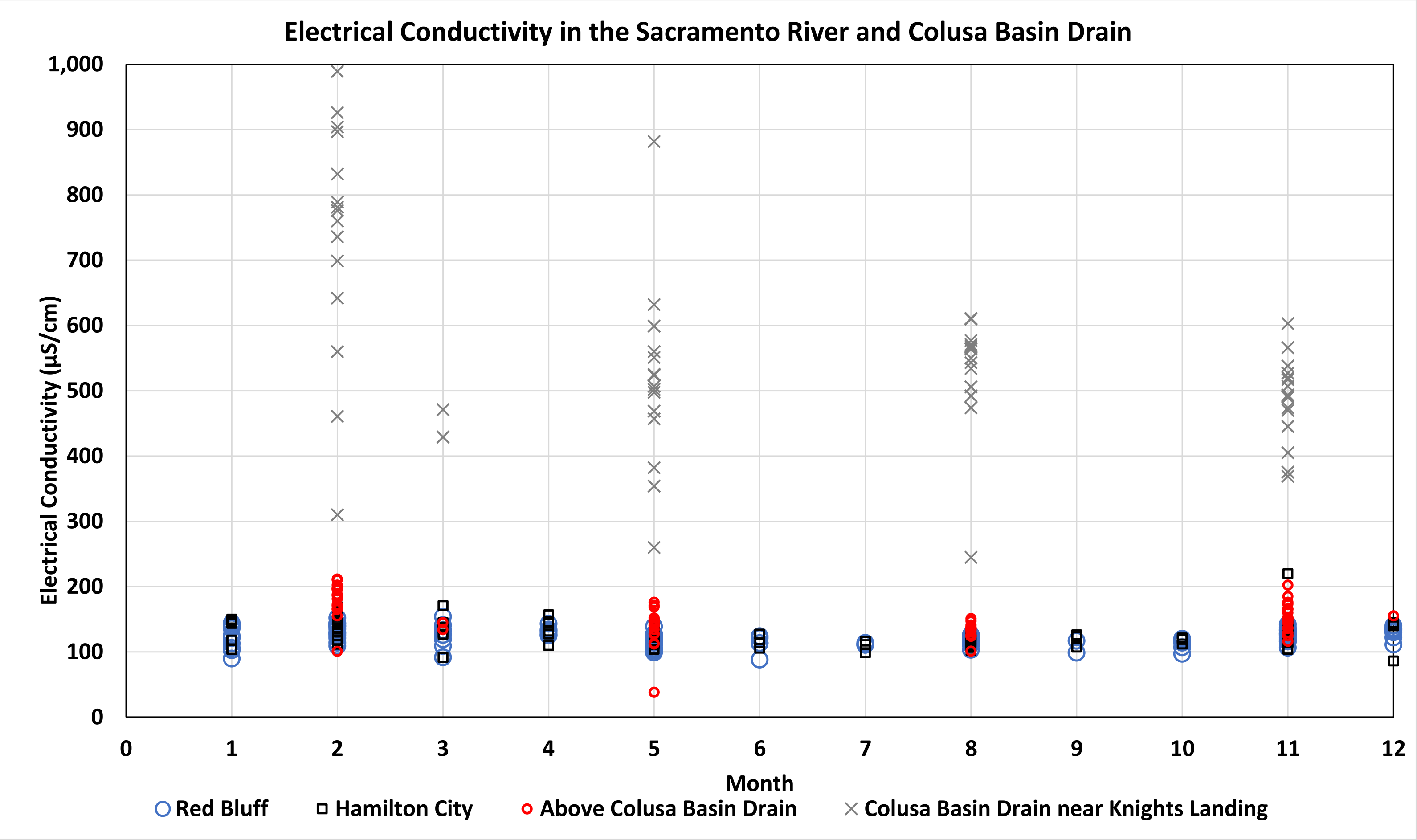
Constituent Group	Data Source	Location
Metals Electrical Conductivity Nutrients	DWR Water Data Library (WDL)	Sacramento River below Red Bluff Sacramento River at Hamilton City Sacramento River above CBD CBD near Knights Landing Stone Corral Creek near Sites
Flow	USGS WDL CA Data Exchange Center	Sacramento River at Keswick Sacramento River above Bend Bridge
Pesticides	CA Dept of Pesticide Regulation Surface Water Database (CDPR SURF)	Sacramento River near Hamilton City Sacramento River at Colusa CBD above Knights Landing Yolo Bypass Toe Drain near Babel Slough

Average Metal/Metalloid Concentrations

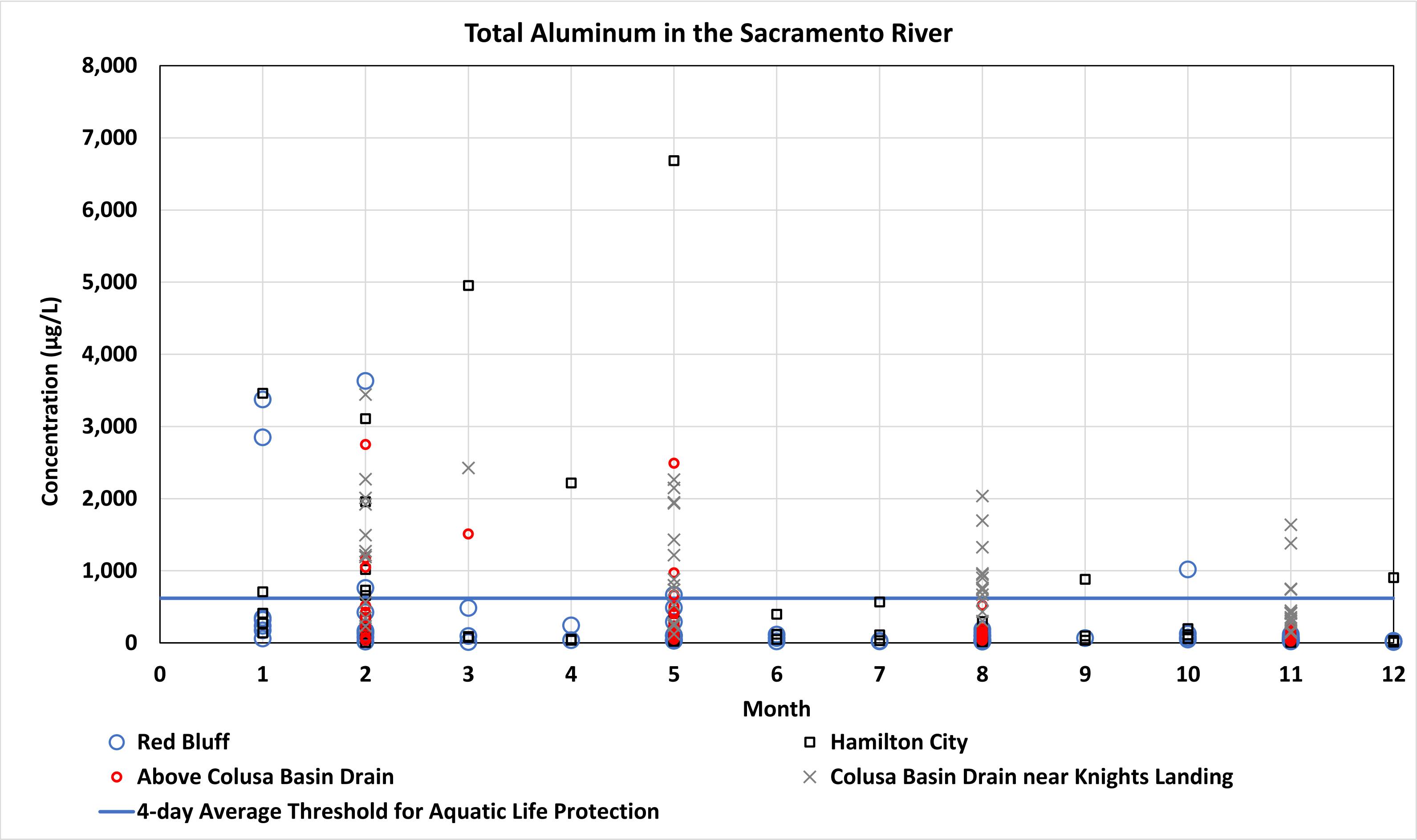
- Units are in micrograms per liter
- No available data for Funks Creek
- Source for Stone Corral Creek and Sacramento River = DWR Water Data Library. See Slide 14
- Source for groundwater is DWR NODOS study (2007)

Metal/Metalloid	Stone Corral Creek	Groundwater in Sites Reservoir Footprint	Sacramento River at Intake Locations
Dissolved Aluminum	149	3	94
Total Aluminum	562	12	359
Dissolved Arsenic	2.8	0.7	1.5
Total Arsenic	3.1	0.8	1.6
Dissolved Cadmium	0.05	0.02	0.04
Total Cadmium	0.06	0.05	0.04
Dissolved Chromium	2.9	2.6	0.7
Total Chromium	4.0	3.3	1.4
Dissolved Copper	2.8	2.7	1.3
Total Copper	3.9	3.4	2.3
Dissolved Iron	123	7	67
Total Iron	512	81	424
Dissolved Lead	0.08	0.12	0.03
Total Lead	0.31	0.27	0.20
Dissolved Manganese	12	18	2
Total Manganese	37	21	15
Dissolved Nickel	2.8	1.0	1.2
Total Nickel	4.0	1.3	2.2
Dissolved Selenium	6.1	4.6	1.2
Total Selenium	6.7	5.0	0.2
Dissolved Silver	0.03	0.00	0.01
Total Silver	0.05	0.01	0.03
Dissolved Zinc	1.4	112.5	0.9
Total Zinc	3.7	115.2	3.8

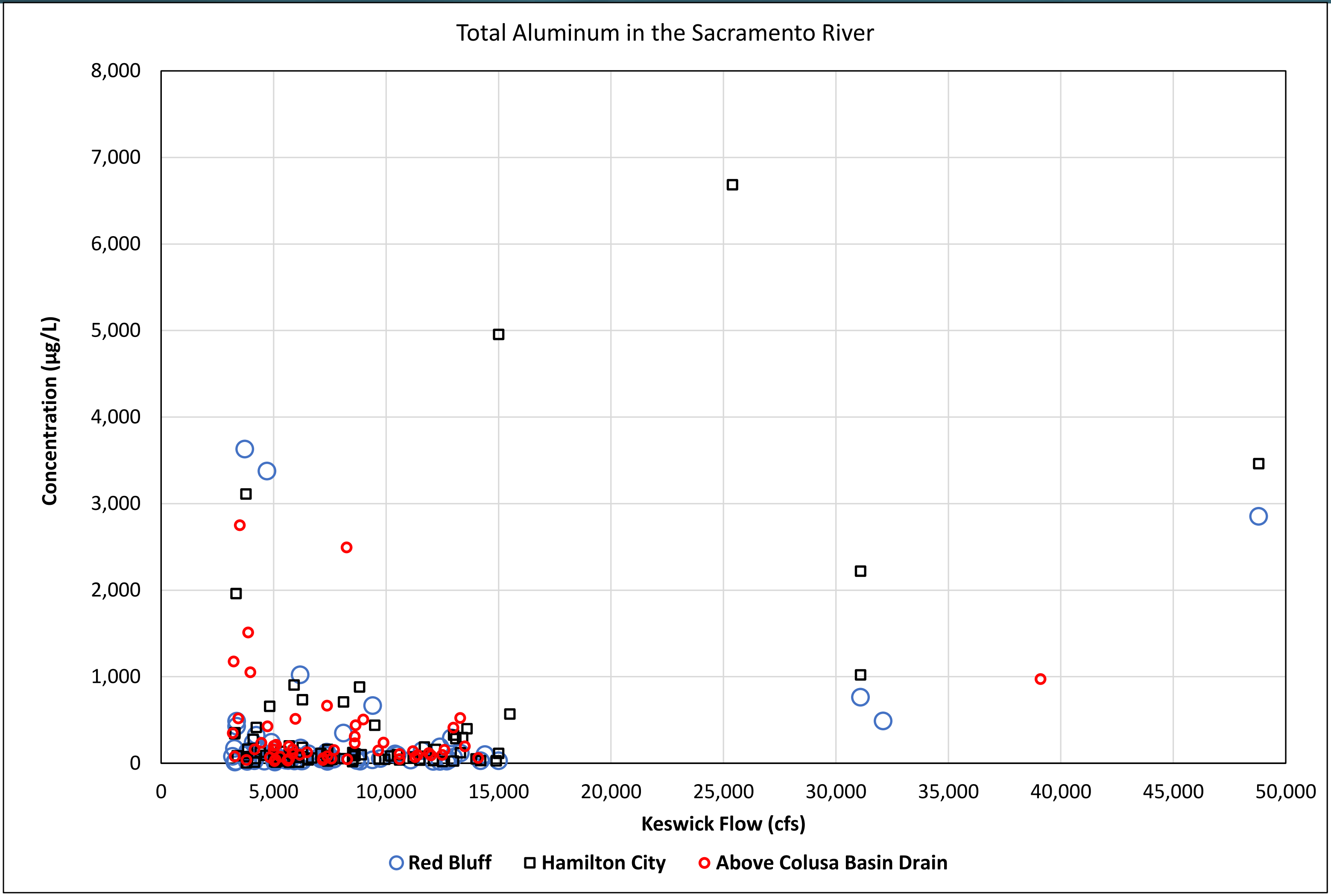
Electrical Conductivity



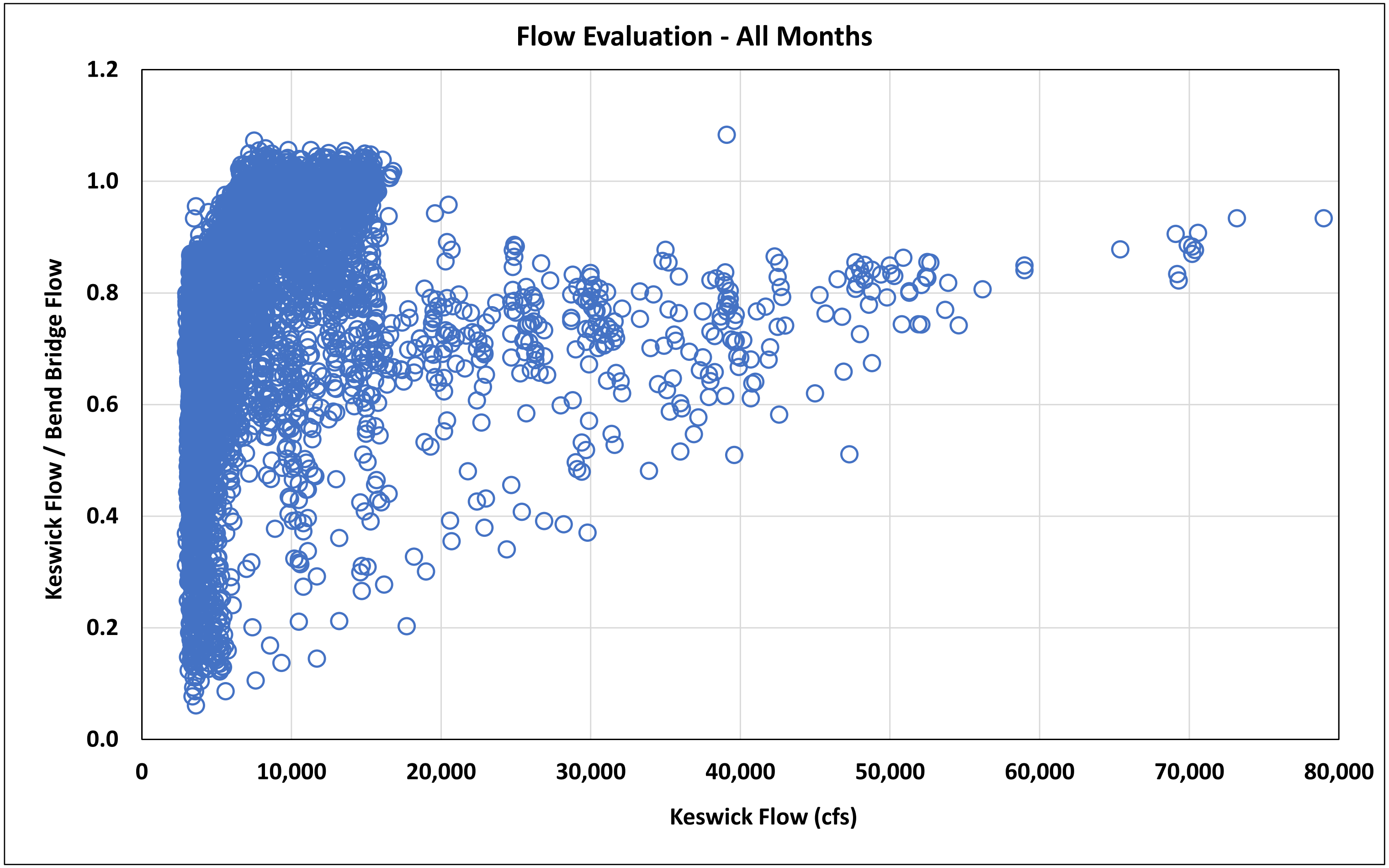
Metals – Aluminum Example



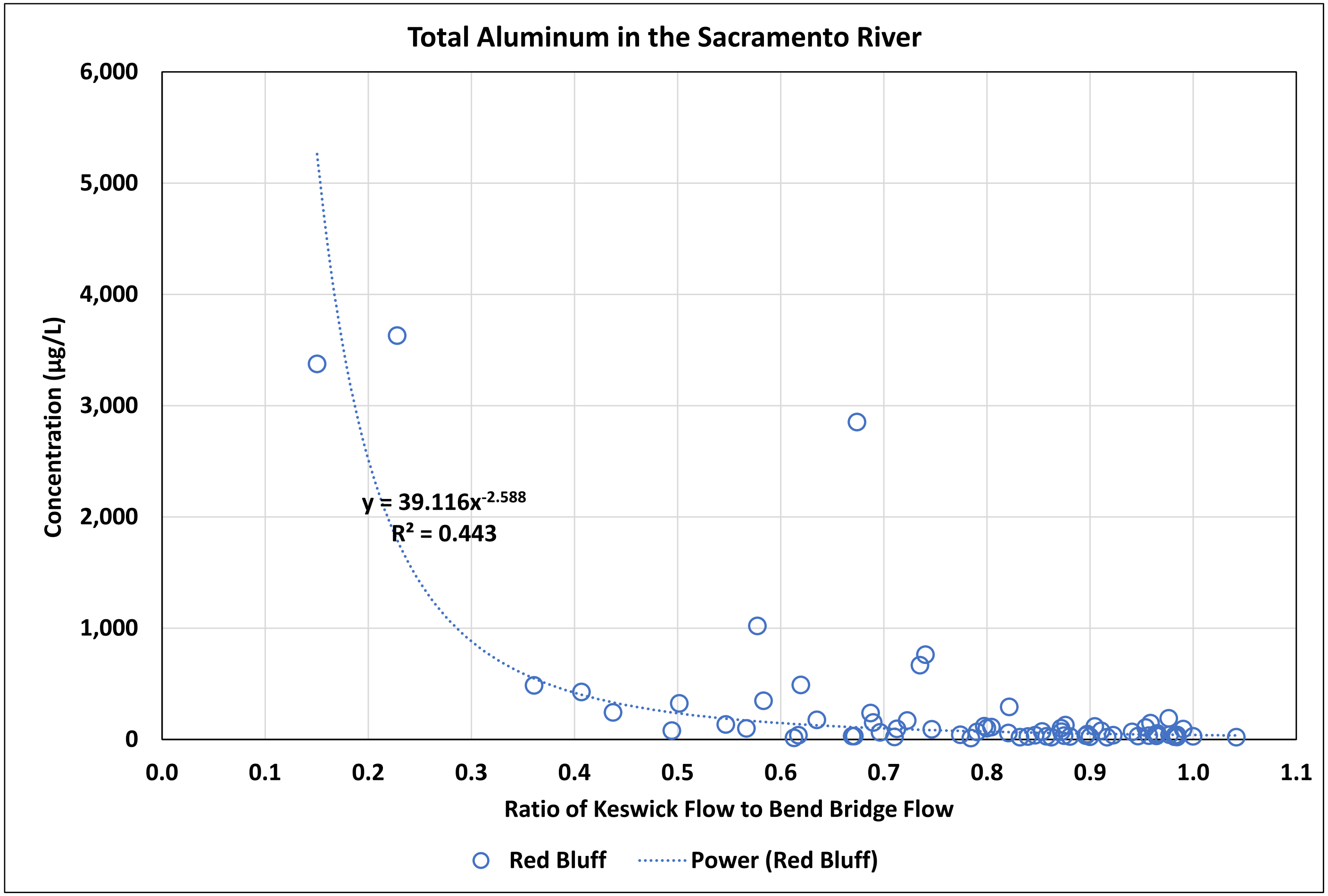
Compared to Flow



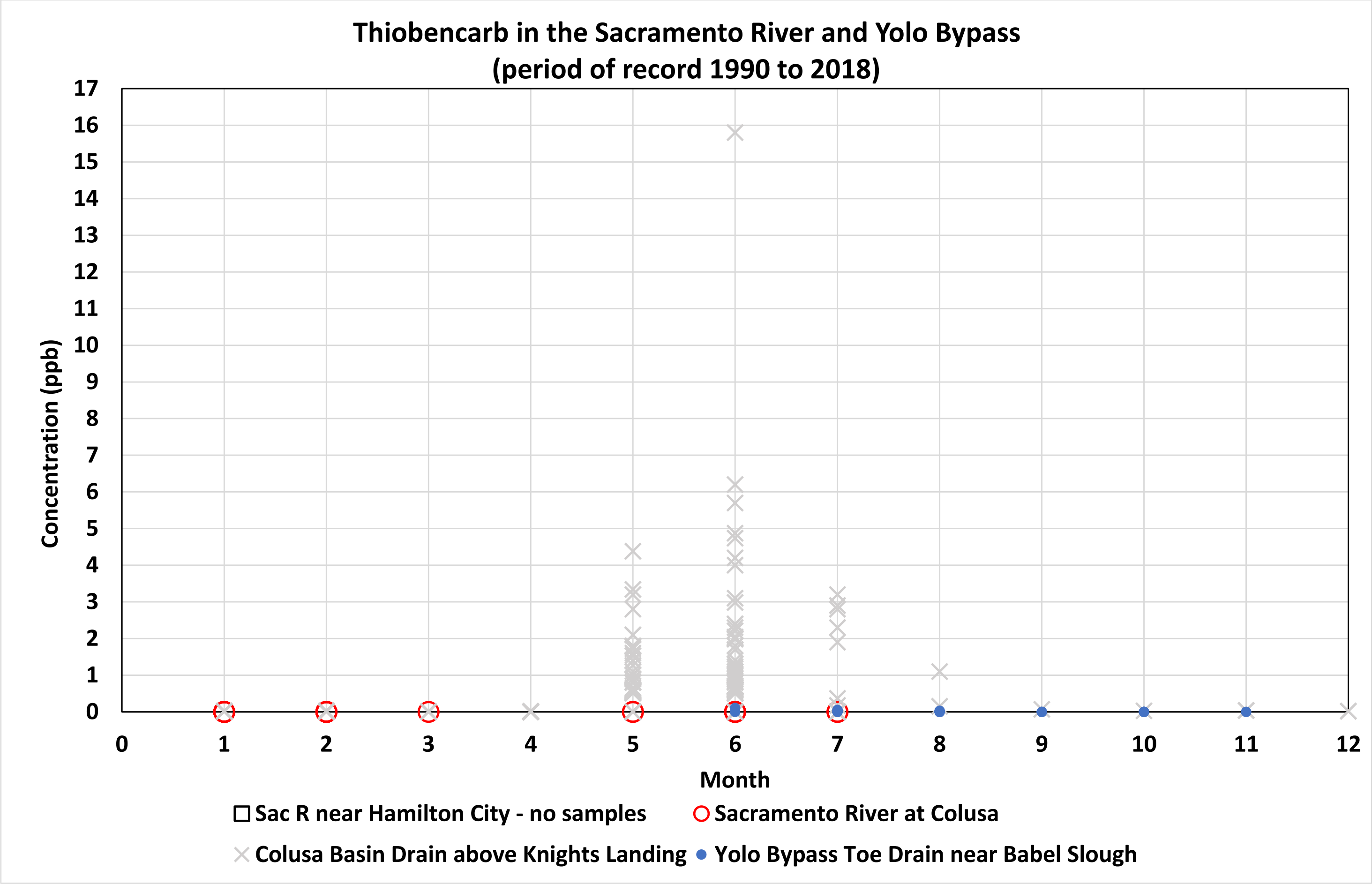
Sacramento River Indicator of Local Runoff vs Flow



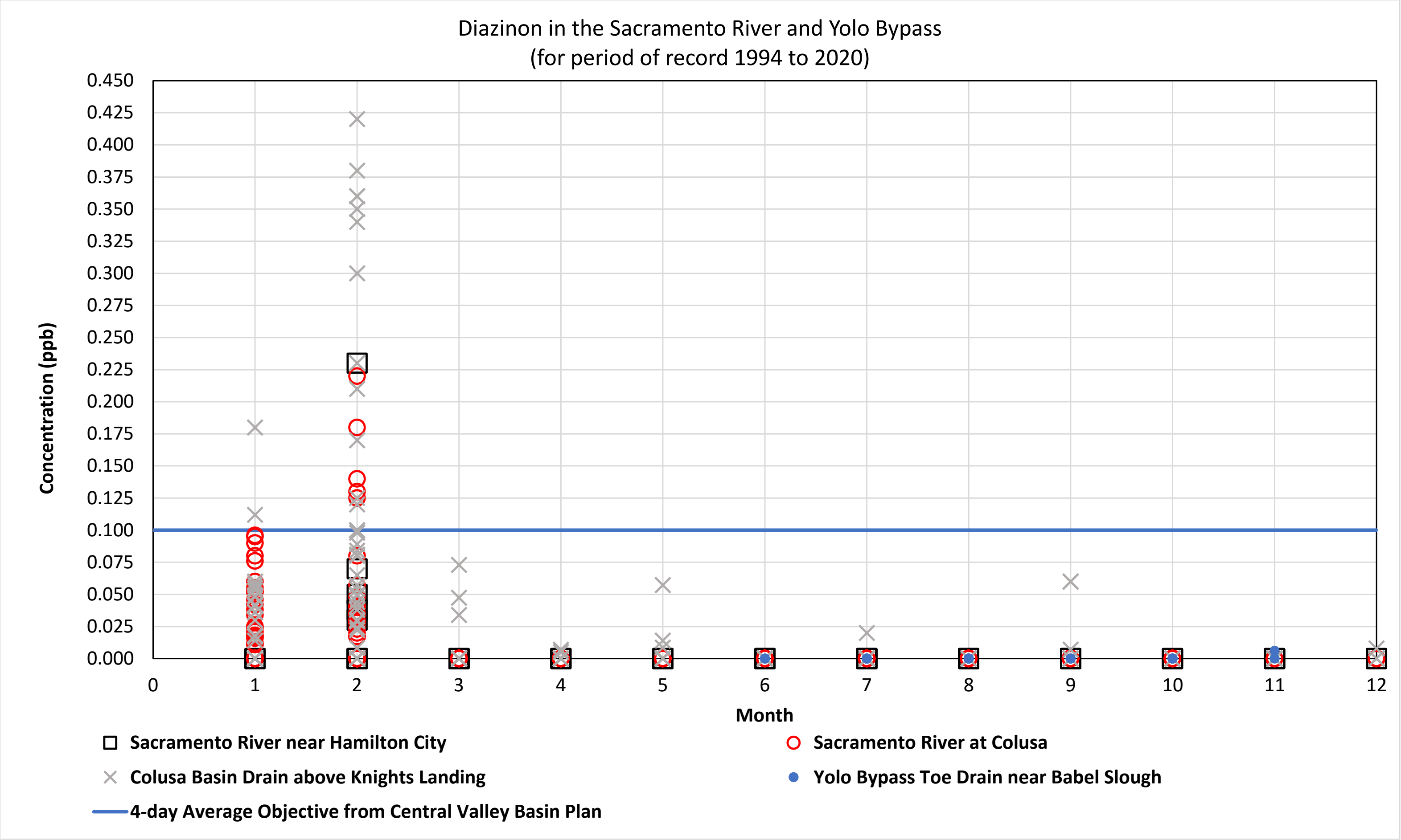
Example Quantitative Approach



Thiobencarb – typical pesticide pattern



Diazinon – atypical pesticide pattern



Other Topics: Salt Pond

- Salt Pond Evaluation:

Estimated Electrical Conductivity (EC in µS/cm) of reservoir release assuming 0.1 cfs salt spring flow is continually mixed with reservoir release and that Sacramento River EC is 130 µS/cm.

Spring EC	Reservoir Release (cfs)	
(µS/cm)[a]	10 cfs	1,200 cfs
7,200	201	131
194,100	2,070	146

[a] Spring EC between these two values.