Water Quality Group Discussion Agenda

Affordable Water, Sustainably Managed

Our Core Values – Safety, Trust and Integrity, Respect for Local Communities, Environmental Stewardship, Shared Responsibility and Shared Benefits, Accountability and Transparency, Proactive Innovation, Diversity and Inclusivity
Our Commitment – To live up to these values in everything we do

Meeting Information:

Date:	July 19, 2021	**Location:**	Microsoft Teams Or call in (audio only) (833) 255-2803,,808172876#
Start Time:	1:00 p.m.	**Finish Time:**	2:30 p.m.
Purpose:	Overview and discussion of the Sites Project's in-lake water quality modeling and EIR/S analysis approach		

Meeting Participants:

André Sanchez	Julie Zimmerman	Cam Irvine
Anthony Saracino	Rachel Zwillinger	Erin Heydinger
Dave Zelinski	Rebecca Wu	John Spranza
Debra Lucero	Regina Chichizola	Laurie Warner Herson
Doug Obegi	Ron Stork	Lesa Erecius
Greg Reis	Stephanie Gordon	Melissa Dekar
Jerry Boles	Tom Stokely	Nicole Williams
Jay Ziegler	Ali Forsythe	Steve Micko
Jim Brobeck	Anne Huber	Vanessa King

Agenda:

Discussion Topic	Topic Leader	Time Allotted
1. Introductions	John	5 min
2. Action Item follow-up	John	10 min
3. Flow mechanisms a. Mixing of Sites water b. Colusa Basin Drain flows to Yolo Bypass c. Delta flows Key Concepts	Anne	40 min
4. Mercury/methylmercury	Anne, Lesa, Steve	15 min
5. Open Topics Discussion	John	15 min

6. Action Items and Adjourn	All	5 mins

Sites Project Water Quality Group Discussion

July 19, 2021

Agenda

1. Introductions
2. Group Norms
3. Action Item Follow-up
4. Flow Pathways and Discharge Effects
   a) Local Agricultural
   b) Colusa Basin Drain
   c) Sacramento River
   d) Stone Corral and Funks Creeks
   e) Yolo and Bay Delta
5. Open Topics and Discussion
6. Action Items and Adjourn

Group Norms

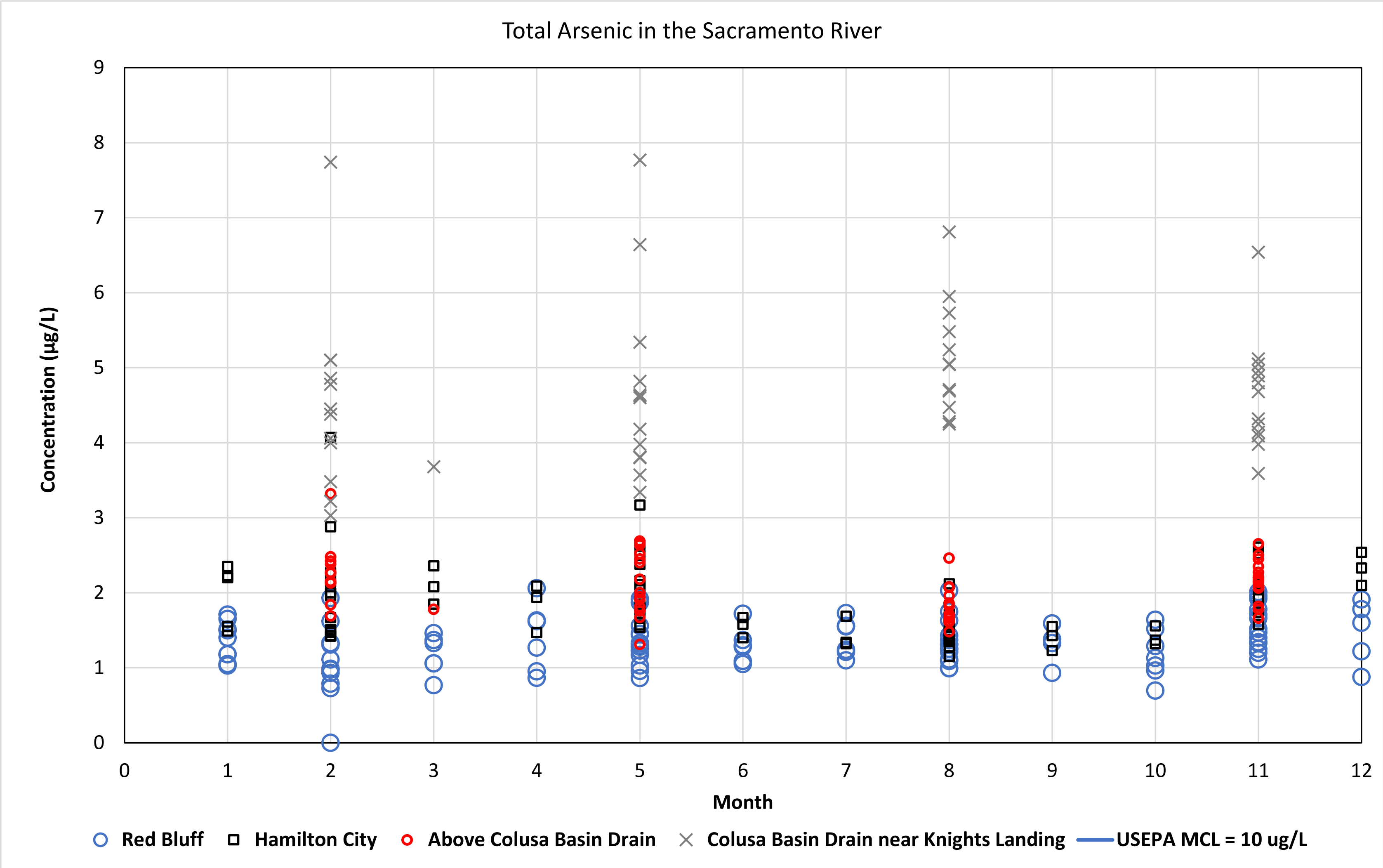
- Encourage everyone to be on video
- Mute yourself when others are speaking
- Respectful, professional dialogue
- Ask questions throughout, lets have a dialogue
  - Let the speaker finish their point
  - Use the raise your hand function in Teams if needed
- Topics for follow up will be recorded and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

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 Pathways

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

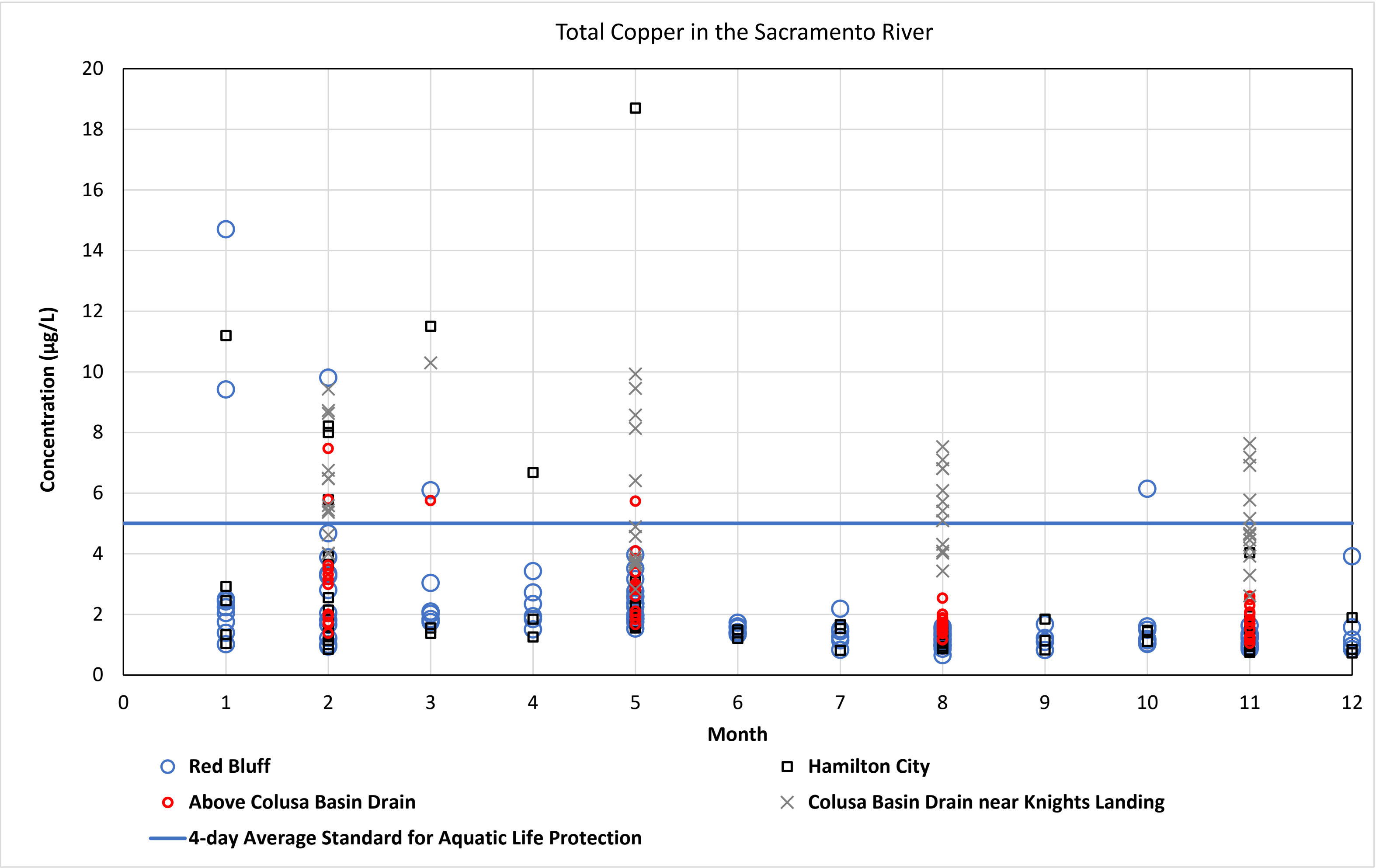
- Generally beneficial to CBD except for methylmercury
- Aqueous Methylmercury: All estimated concentrations in Sites Reservoir releases except expected long-term average (0.10 ng/L) would exceed average baseline concentrations in CBD (0.13 and 0.17 ng/L avg for 2 different data sets)
- Fish Tissue Methylmercury:
  - 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

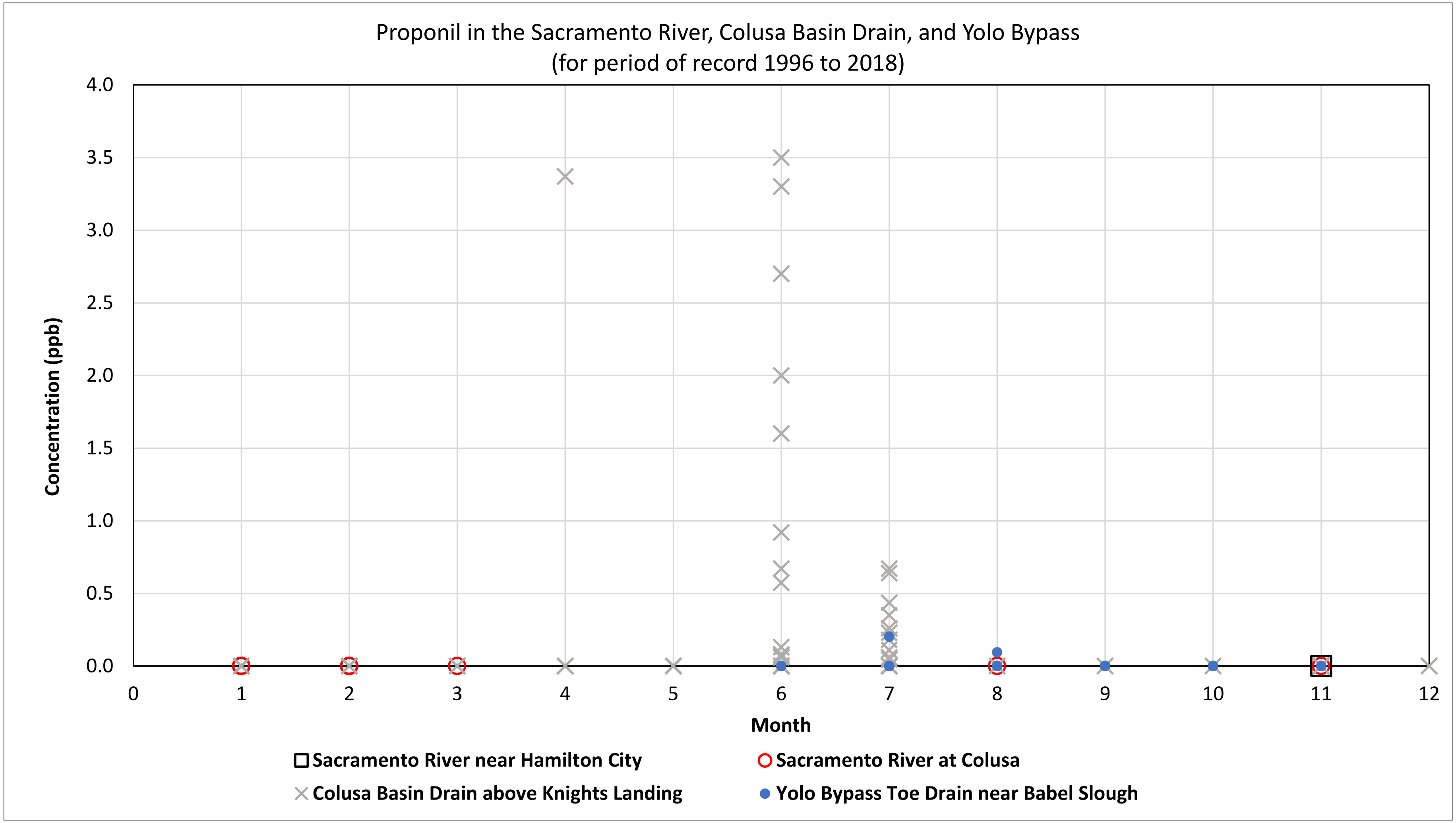
- RMP and Mitigation Measure WQ-1.1
  - Remove vegetation in inundation footprint prior to initial filling
  - Delay fish stocking- approx. 10 years after initial filling
  - Monitor reservoir fish tissue methylmercury
  - Post fish consumption warning signs if fish tissue methylmercury concentrations 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

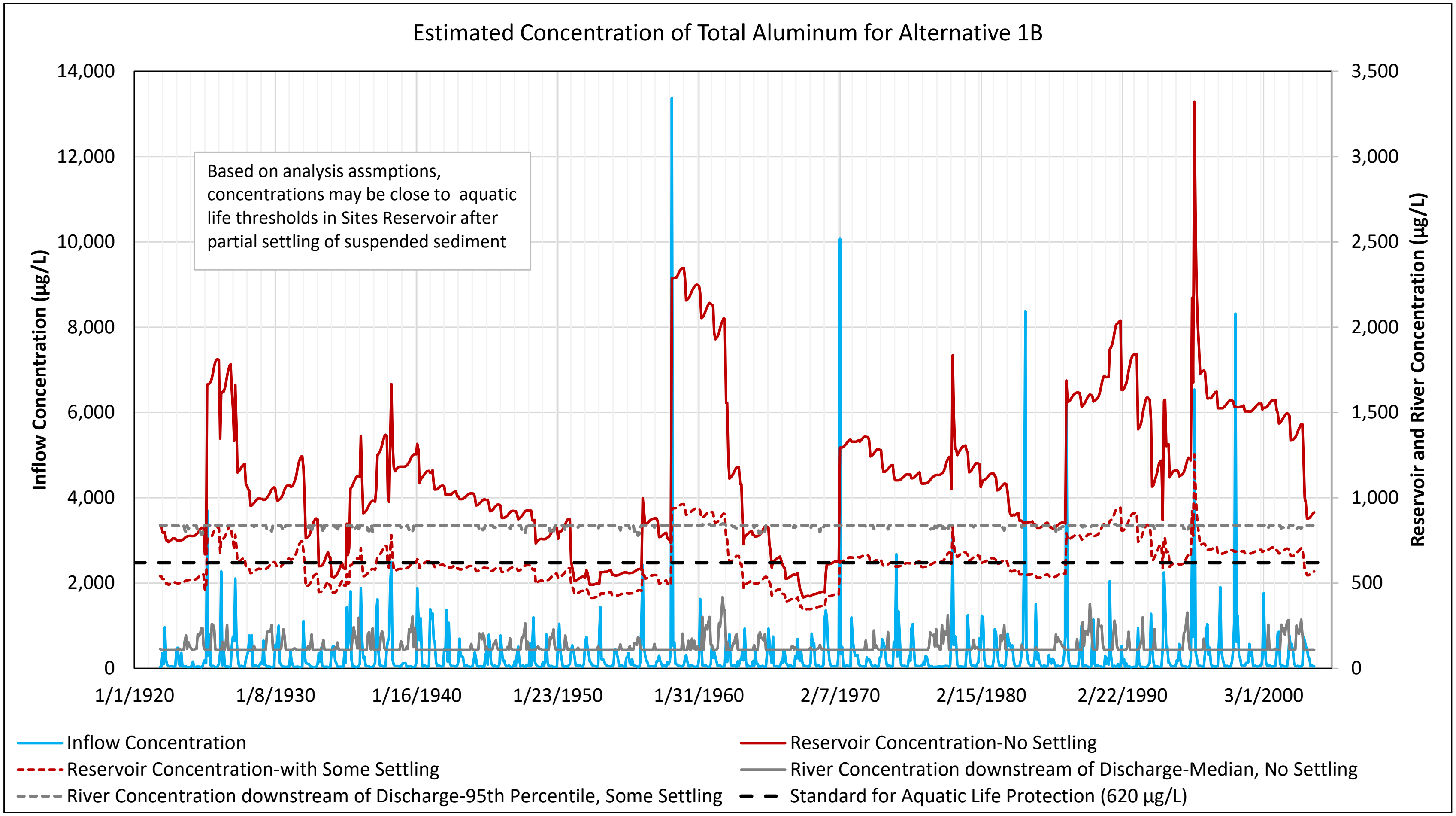
Discharge to Sacramento River-Dilution

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

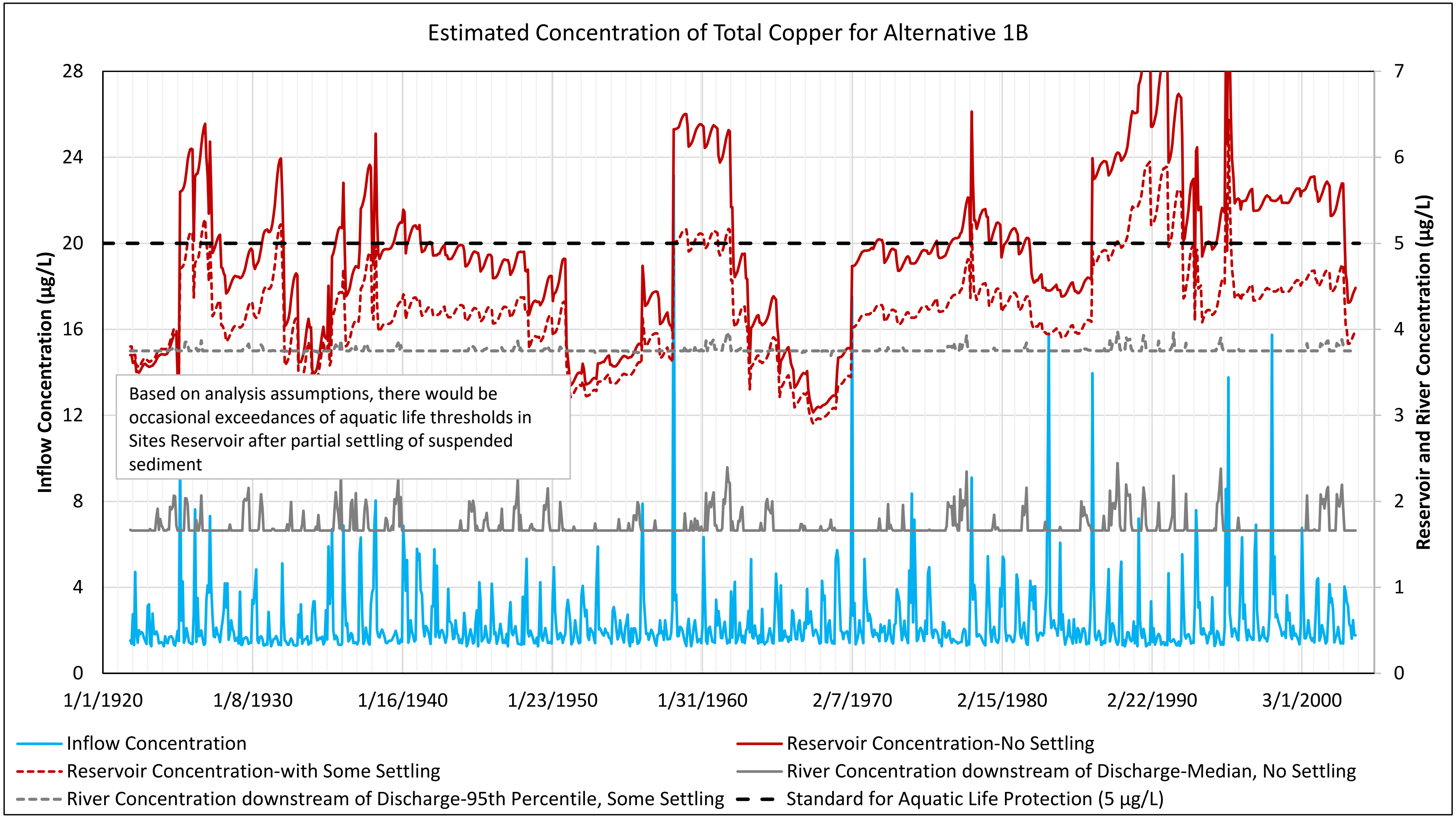
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Average for Critically Dry Water Years												
NAA	0	0	0	0	0	0	0	0	0	0	0	0
Alt 1A	204	99	3	0	0	0	108	432	529	615	416	428
Alt 1B	127	96	10	15	0	13	123	417	520	621	435	373
Alt 2	131	100	3	0	0	0	109	425	497	605	346	319
Alt 3	80	83	10	19	21	78	148	396	464	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

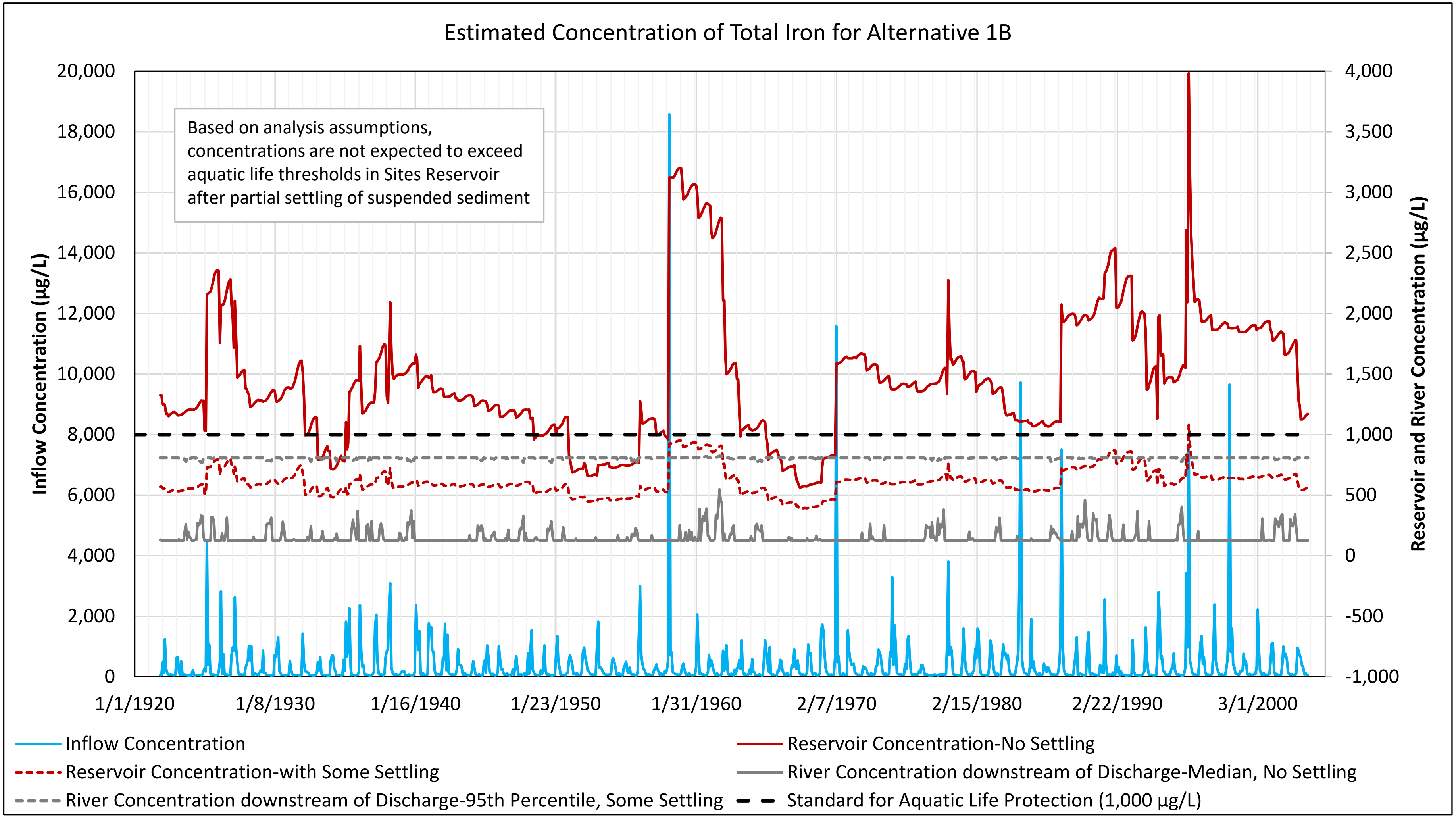
Discharge to Sacramento River- Total Aluminum



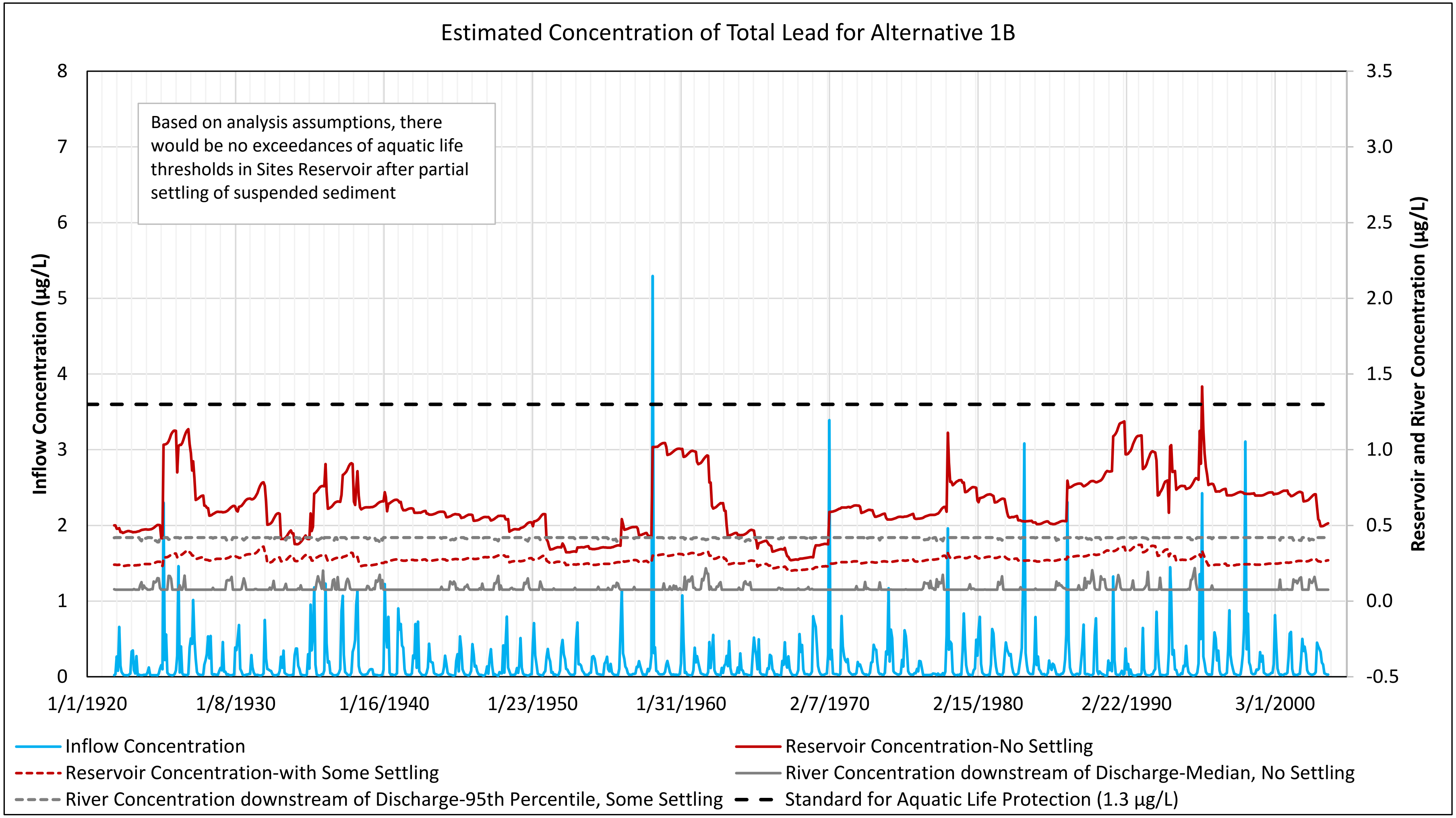
Discharge to Sacramento River- Total Copper



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