Workshop on the Draft Scientific Basis Report Supplement for the Tuolumne Healthy Rivers and Landscapes Proposal

November 5, 2025

Agenda Item 9

CALIFORNIA Water Boards

State Water Resources Control Board

Workshop Overview

- Presentation Overview
  - Brief background on the Water Quality Control Program for the San Francisco Bay/Sacramento-San Joaquin Delta Watershed (Bay-Delta Plan)
  - Tuolumne Healthy Rivers and Landscapes[1] (T-HRL) Proposal (also known as a Voluntary Agreement or VA)
  - Draft Scientific Basis Report (SBR) Analyses
  - Next Steps
- Department of Water Resources Statement
- Panel Presentations
- Public Oral Comments
- Board Member Discussion

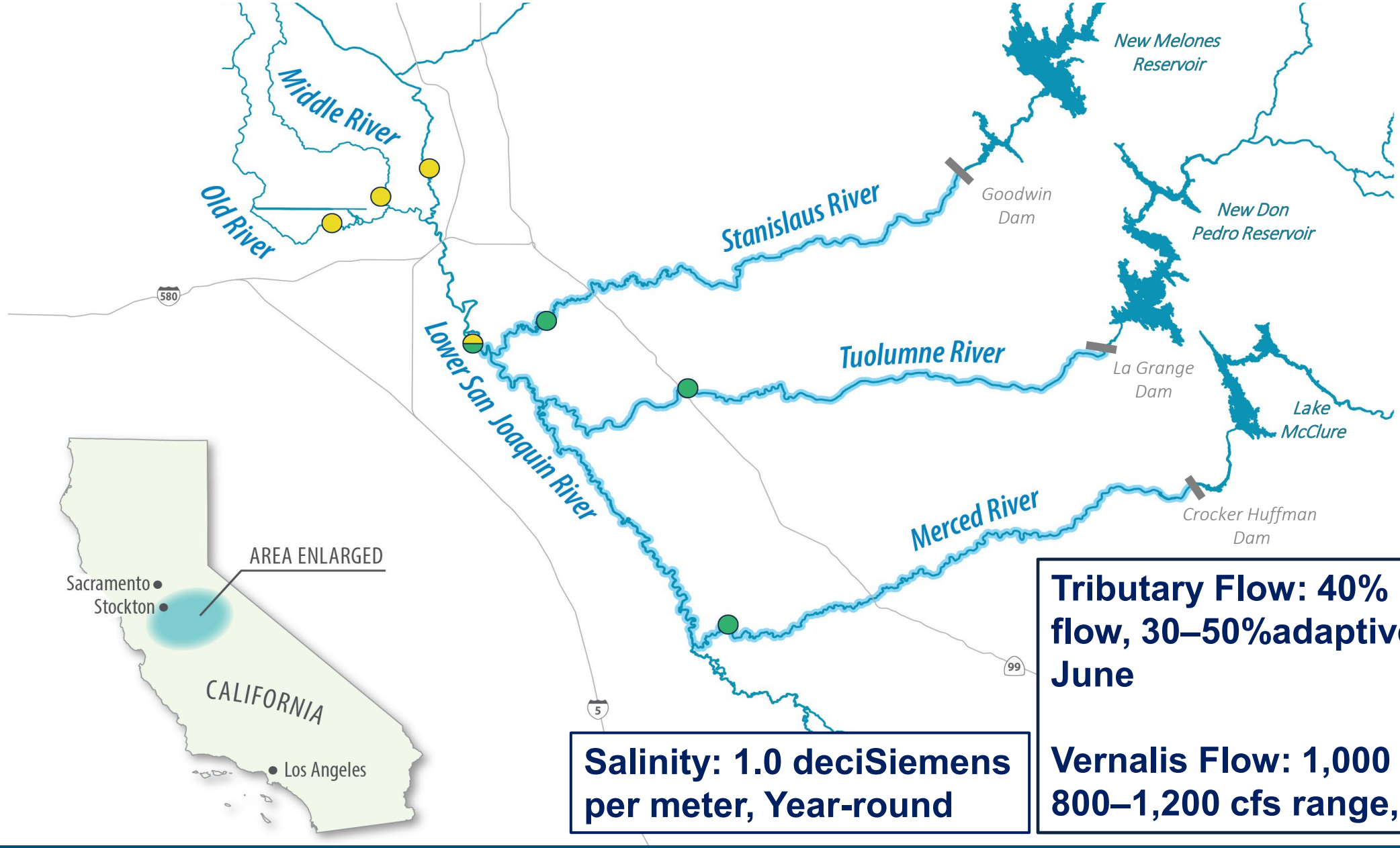
[1]Also referred to as the Tuolumne River Voluntary Agreement

Bay-Delta Plan[1]

- Identifies beneficial uses of water, water quality objectives to protect those uses, a program of implementation to achieve the objectives, and monitoring and special studies
- Lower San Joaquin River (LSJR) flow and southern Delta salinity provisions updated in 2018
- Sacramento/Delta provisions currently in the process of being updated

[1] https://www.waterboards.ca.gov/plans_policies/docs/2018wqcp.pdf

2018 Bay-Delta Plan Update



Tributary Flow: 40% unimpaired flow, 30–50%adaptive range, Feb–June

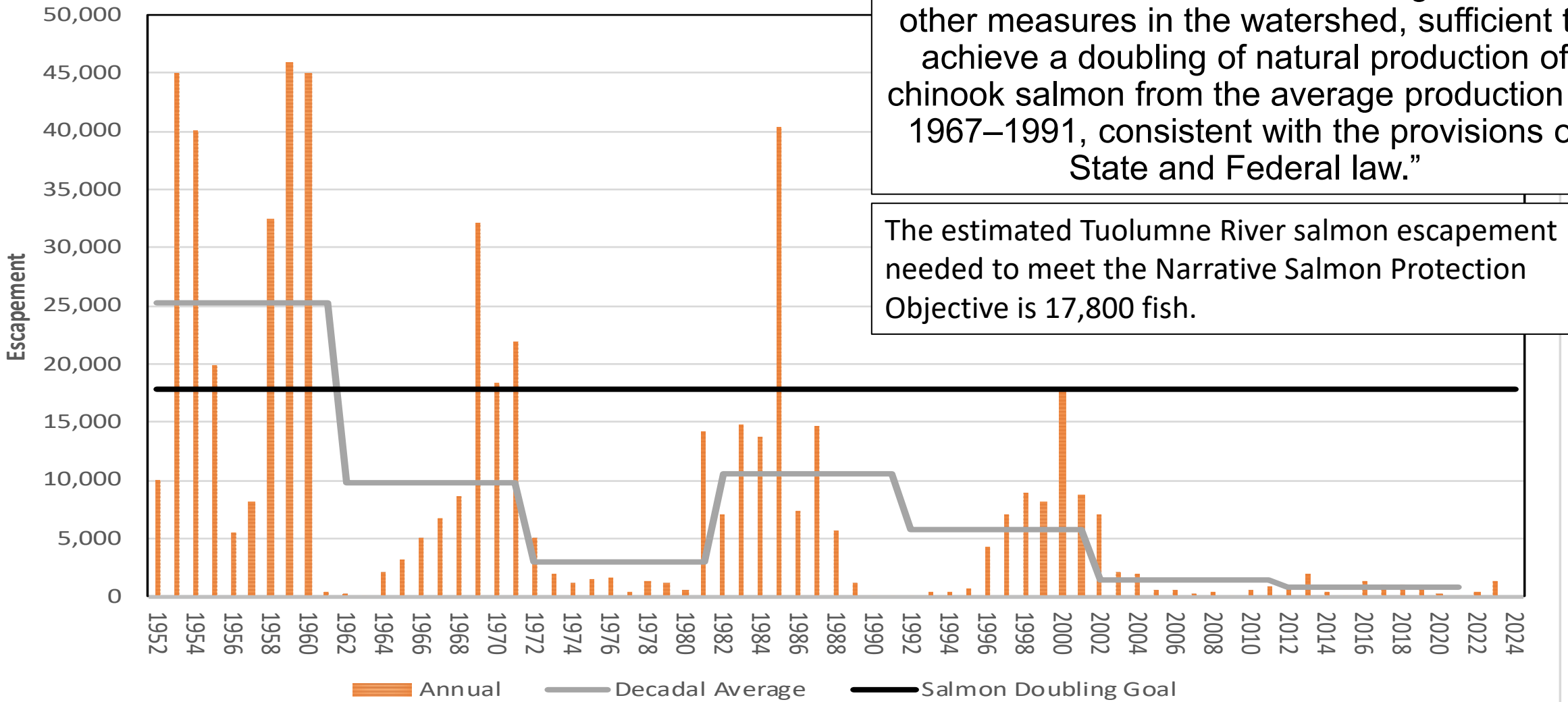
Vernalis Flow: 1,000 cfs, 800–1,200 cfs range, Feb–June

Salinity: 1.0 deciSiemens per meter, Year-round

Salmon Protection Objective

Salmon Protection Objective: "Water quality conditions shall be maintained together with other measures in the watershed, sufficient to achieve a doubling of natural production of chinook salmon from the average production of 1967–1991, consistent with the provisions of State and Federal law."

The estimated Tuolumne River salmon escapement needed to meet the Narrative Salmon Protection Objective is 17,800 fish.

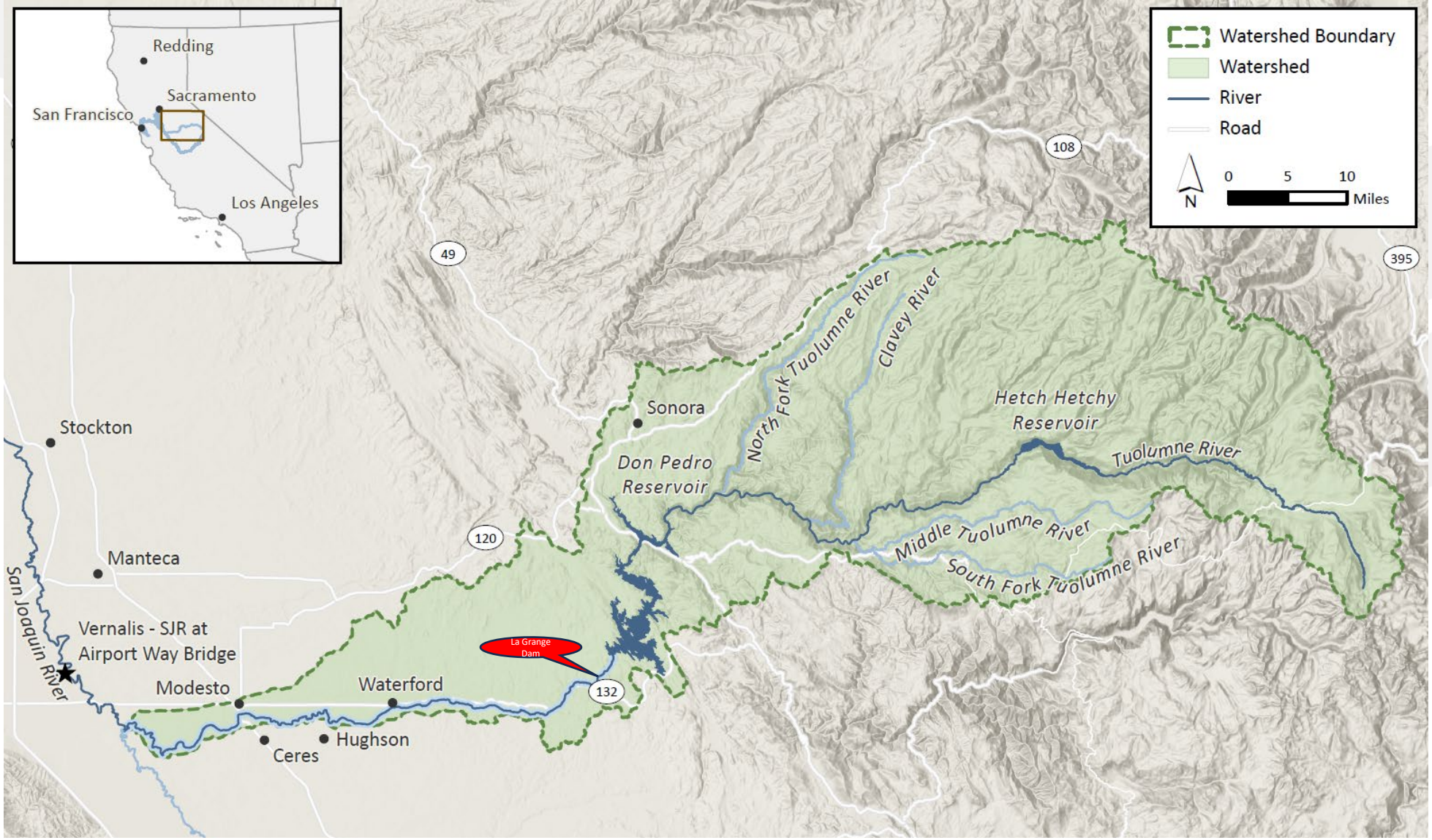


Tuolumne Healthy Rivers and Landscapes (HRL)

- November 2022 – Board received a revised Memorandum of Understanding (MOU) that included a proposed Tuolumne River VA[1]
  - Tuolumne Parties[2] submitted the MOU so that the Board may consider modifying the Bay-Delta Plan to allow the T-HRL to be implemented
- April 2023
  - Notice of Preparation to start the process to evaluate and consider the T-HRL
  - Potential update to the Bay-Delta Plan Program of Implementation

[1]The voluntary agreement proposal was subsequently named the Healthy Rivers and Landscapes proposal.

[2]San Francisco Public Utilities Commission, Modesto Irrigation District, and Turlock Irrigation District.



Project Area: Tuolumne River watershed (green area on map) as well as the Lower San Joaquin River (LSJR) and through the Bay-Delta. The project area also covers areas receiving water exported from the Tuolumne River watershed, LSJR, and Bay-Delta that could be impacted by implementation of the T-HRL.

Tuolumne HRL Proposal: Overview

- The Tuolumne Parties:
  - Modesto Irrigation District
  - Turlock Irrigation District
  - San Francisco Public Utilities Commission (represents City and County of San Francisco)

- Proposal consists of January–June flow and non-flow commitments

- T-HRL would be implemented initially for an 8-year period, with the possibility of extension, in lieu of implementing flow and related requirements in the 2018 Bay-Delta Plan

Tuolumne HRL: Proposed Flow Commitments

Critical	Dry	Below Normal	Above Normal	Wet
86 (17) TAF	140 (40) TAF	127 (98) TAF	138 TAF	138 TAF

- Flows are additive to existing January–June minimum instream flow requirements on the Lower Tuolumne River (1995 Federal Energy Regulatory Commission (FERC) license for the Don Pedro Project), measured downstream of La Grange Dam
- Proposed HRL flows include a minimum instream base flow and spring pulse flows
- Parenthetical volumes represent sequential dry-year offramps and apply during successive critical, dry, or below normal water years
- One or two pulses (not yet decided) proposed to contribute to Delta outflows

Tuolumne HRL: Proposed Non-Flow Commitments

- 75,000 tons (approx.) of gravel between river mile 52 and 39
- 25,000 tons (approx.) of gravel between river mile 39 and 24.5
- 77 acres of constructed rearing/floodplain habitat to be inundated at the proposed Tuolumne HRL flows
- Addition of large woody debris
- Gravel cleaning
- Predator control program
- Redd superimposition reduction
- Infiltration galleries (at RM 26) June–October to assist summer rearing habitat for salmonids

Tuolumne HRL: Proposed Non-Flow Commitments

- Tuolumne Parties would collaborate with the California Department of Fish and Wildlife and federal fishery agencies in further defining non-flow measure projects
- Tuolumne Parties would self-fund non-flow measure implementation and associated operation/maintenance for the 8-year term of the T-HRL
  - Approximately $64 million for project implementation
  - Approximately $17 million for operations and maintenance over the 8-year term

Draft Scientific Basis Report Supplement for the Tuolumne HRL Proposal

- The Draft Scientific Basis Report (SBR) Supplement for the Tuolumne River VA evaluates the effects of the T-HRL
- Initial step of a potential update to the Bay-Delta Plan
  - The analyses inform the Board's consideration of the T-HRL
- Developed in collaboration with staff of CA Department of Fish and Wildlife and Department of Water Resources (DWR)
- T-HRL SBR will be submitted for scientific peer review pursuant to the requirements of the Health and Safety Code

T-HRL Scientific Basis Report Content

- Chapter 1: Introduction
- Chapter 2: Aquatic Ecosystem Stressors
- Chapter 3: Description Flow and Non-Flow Assets
- Chapter 4: Hydrological Evaluation
- Chapter 5: Water Temperature
- Chapter 6: Predator Control
- Chapter 7: Spawning and Rearing Habitat
- Chapter 8: Traditional Ecological Knowledge
- Chapter 9: Conclusions and Uncertainty

Tuolumne River Stressors to Salmonids

- Chapter 2
  - Loss and alteration of physical habitat
  - Predation
  - Temperature impairments
  - Flow impairments
  - Hatcheries

Limiting Factors Analysis

- Quantitative evaluation of environmental factors associated with the Tuolumne River fall-run Chinook salmon population
- Stock-recruitment models
  - How many juvenile salmon are produced per spawner
  - Statistical model
    - Non-linear multiple regression model
  - Assesses density-dependence factors (Ricker)
  - Spawner abundance: escapement
  - Juvenile abundance: rotary screw trap at Waterford
  - Fifteen environmental covariates
    - Flow, water temperature, and habitat

Limiting Factors Analysis Findings

- Statistical comparison showed relative strength of certain factors to influence juvenile survival and abundance compared to others
- Density-dependent factors showed little influence on juvenile productivity
- Spring water temperatures
  - Lower average temperatures during May and January–May were associated with higher juvenile productivity
- Spring flow
  - Higher average flow during January–May were associated with higher juvenile productivity
- Floodplain habitat
  - Greater acres of suitable floodplain habitat were associated with higher juvenile productivity
- See Chapter 2 and Appendix A for more information

Modeling Scenarios Evaluated

- Existing Conditions
  - Represents conditions as of 2023
  - Applies 1995 FERC Settlement Agreement on the Tuolumne River
- T-HRL
  - Jan – Jun flow requirements from 2020 FERC Final Environmental Impact Statement (FEIS), with modifications
  - Jul – Dec flow requirements from 1995 FERC Settlement Agreement
- 30%, 40%, and 50% Unimpaired Flow (UF) Objective Scenarios
  - UF objectives applied Feb – Jun
  - Jul – Jan flow requirements from 1995 FERC Settlement Agreement

Hydrological Evaluation

- T-HRL flow commitments modeled to inform potential relative changes to flow timing and magnitude in the Tuolumne and San Joaquin Rivers
- Water Supply Effects (WSE) Model
  - Developed by the State Water Board and used to support the 2018 Bay-Delta Plan update
  - Monthly spreadsheet-based water balance model for the LSJR and tributaries, including the Tuolumne River for 82-year period of record
  - Primary WSE outputs include monthly flow volumes, reservoir storage levels, and major irrigation district diversions

Hydrological Evaluation

- T-HRL Parties Draft Accounting Spreadsheet Model (April 2025)
  - Developed to demonstrate how the T-HRL flows will be accounted for in the Tuolumne River and as Delta outflow
  - Daily operations model for 1999–2023 (25 years)
  - Represents daily flow conditions anticipated to occur under the 1995 FERC requirements and from the implementation of the T-HRL, including baseflows, pulse flows, reservoir spills, etc.
  - Used to inform the assumptions for the WSE modeling

Hydrological Evaluation Results

Estimates for New Flow Contributions Resulting from the T-HRL at La Grange Dam During January Through June Averaged for All Years and by WYT (in TAF)

Water Year Type	Critically Dry	Dry	Below Normal	Above Normal	Wet	All Years
New T-HRL flow estimates using the T-HRL Parties' VA Accounting Spreadsheet	37	50	58	-46	-89	2.1
New T-HRL flow estimates using the WSE model	38	42	32	6	-28	12

Hydrological Evaluation Results

January Through June Expected Change (Relative to Existing Conditions) in Delta Outflow Averaged by WYT from the TP Accounting Spreadsheet (in TAF)

Water Year Type	Protection Period	Critically Dry	Dry	Below Normal	Above Normal	Wet	All Years
New outflow if flows are protected for both T-HRL pulse periods	March 16–May 31	26	47	52	19	-40	17
New outflow if flows are protected for only the T-HRL outmigration pulse period	April 16–May 31	13	33	49	-1	-42	7

Temperature Evaluation

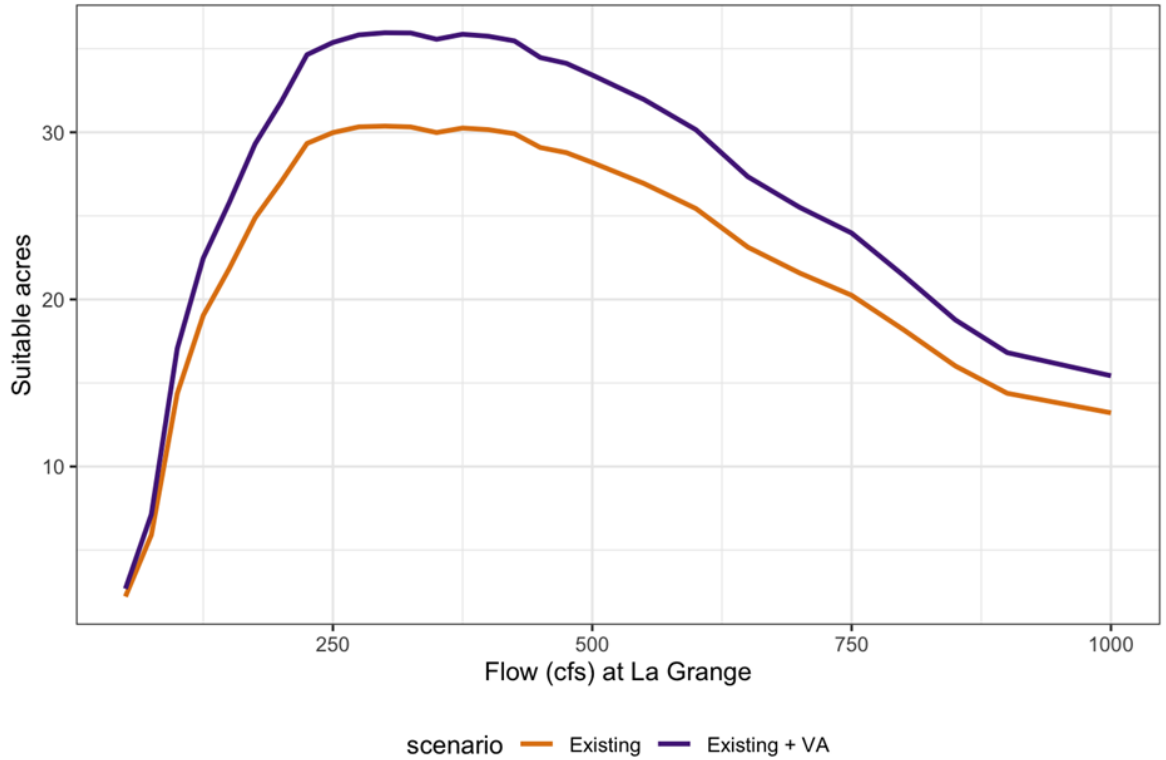
- Temperature effects modeled using the SJR HEC-5Q model
  - Simulates reservoir and river temperatures in the LSJR watershed, including the Tuolumne River
  - Uses hydrologic inputs derived from WSE and historical meteorology
  - Model output is produced on a 6-hour timestep from 1970 to 2003
- Same modeling scenarios as in the hydrologic evaluation
- Modeled water temperature results were assessed against salmonid life stage specific temperature benchmarks, timing, and river location
  - Frequency of temperature benchmark attainment
  - Temporally and spatially for life stages
  - Habitat qualifier (Chapter 7)

Temperature Evaluation Results

- Modeling results consistent with observed existing conditions – salmonids experience stressful temperature conditions in the Tuolumne River
- T-HRL modeling scenario would generally result in lower water temperatures during March to May
- T-HRL would likely result in significant temperature improvements (lower temperatures) in May in the Tuolumne and LSJR
- T-HRL temperature benefits considerably reduced during proposed drought off-ramp years

Habitat Evaluation

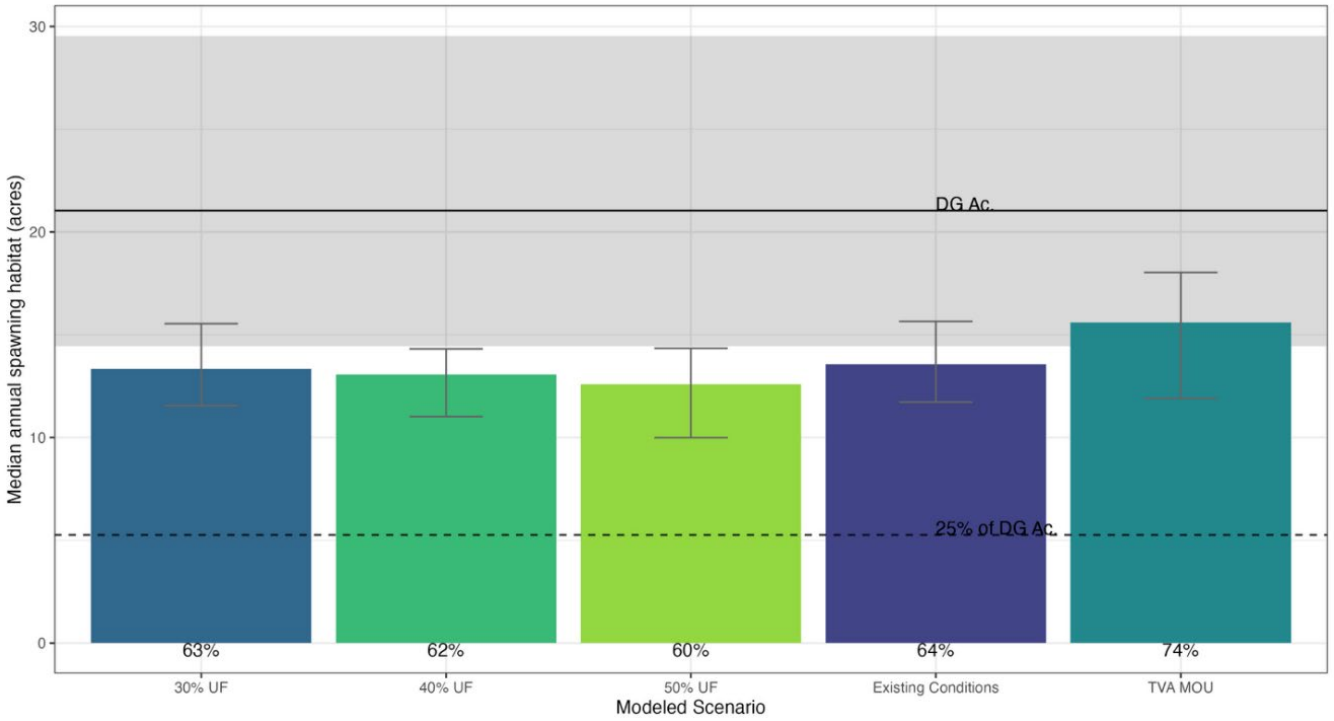
- Suitable Habitat Metrics
  - Spawning
  - In-channel juvenile rearing
  - Floodplain juvenile rearing
  - Combined in-channel and floodplain
  - Meaningful floodplain event



- Weighted Usable Area (WUA) suitable habitat were qualified using water temperatures predicted from the temperature model
- Doubling goal population acreage need estimated

Spawning Habitat

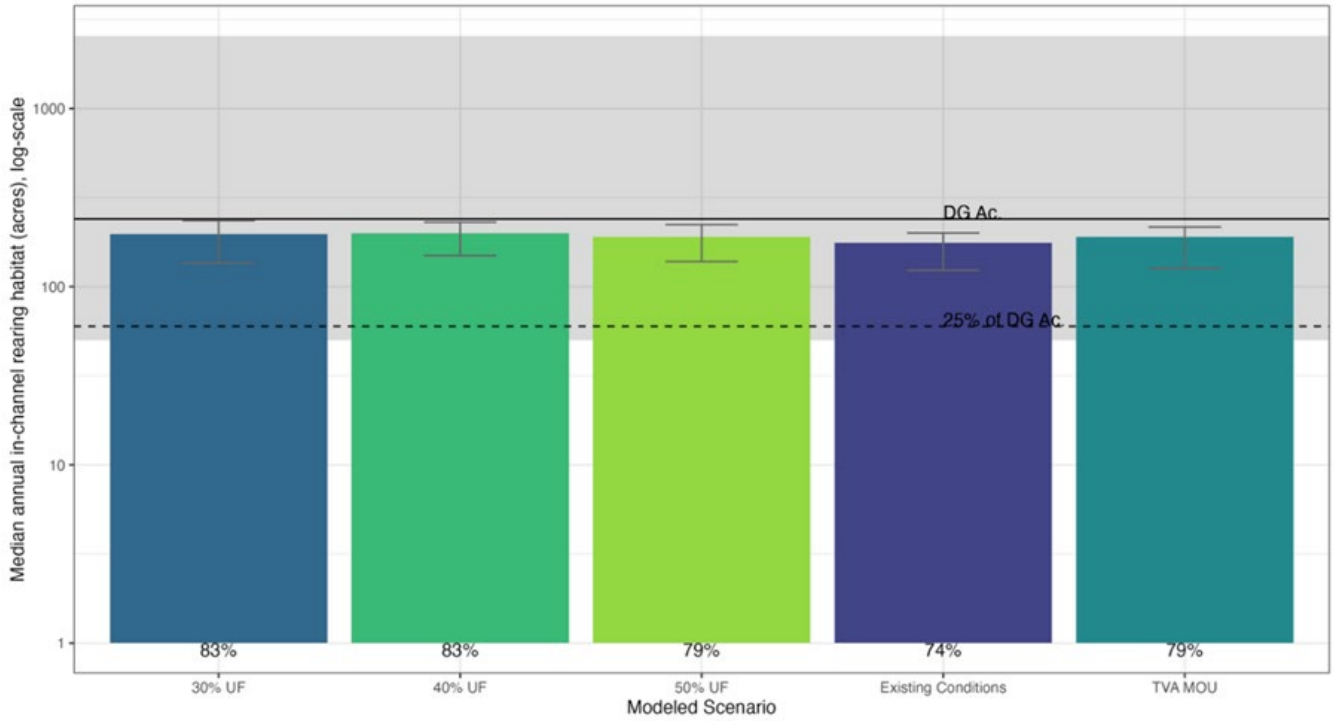
Temperature Filtered Habitat



	No temperature filter	Temperature filter	
Scenario	**Median estimated acres**	**Median estimated acres**	**Percent of doubling goal acreage**
30% UF	28 (23, 30)	13.3 (12, 16)	63%
40% UF	28 (19, 30)	13.1 (11, 14)	62%
50% UF	28 (19, 30)	12.6 (10, 14)	60%
Existing Conditions	28 (23, 30)	14 (12, 16)	64%
TVA	33 (27, 35)	16 (12, 18)	74%

In-channel Rearing Habitat

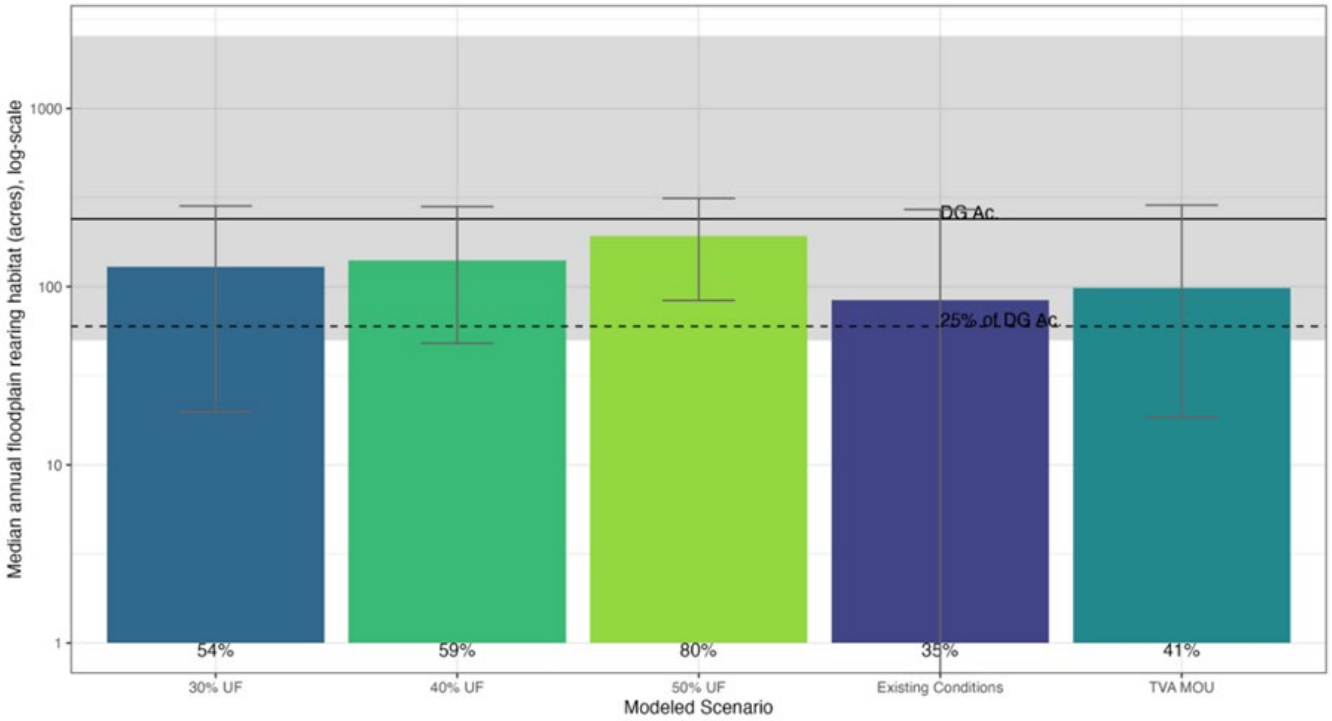
Temperature Filtered Habitat



Scenario	No temperature filter: Median estimated acres	Temperature filter: Median estimated acres	Temperature filter: Percent of doubling goal acreage
30% UF	202 (146, 297)	198 (136, 235)	83%
40% UF	205 (157, 277)	199 (149, 230)	83%
50% UF	195 (140, 251)	190 (138, 223)	79%
Existing Conditions	271 (168, 366)	176 (124, 200)	74%
TVA	259 (170, 349)	190 (127, 216)	79%

Floodplain Rearing Habitat

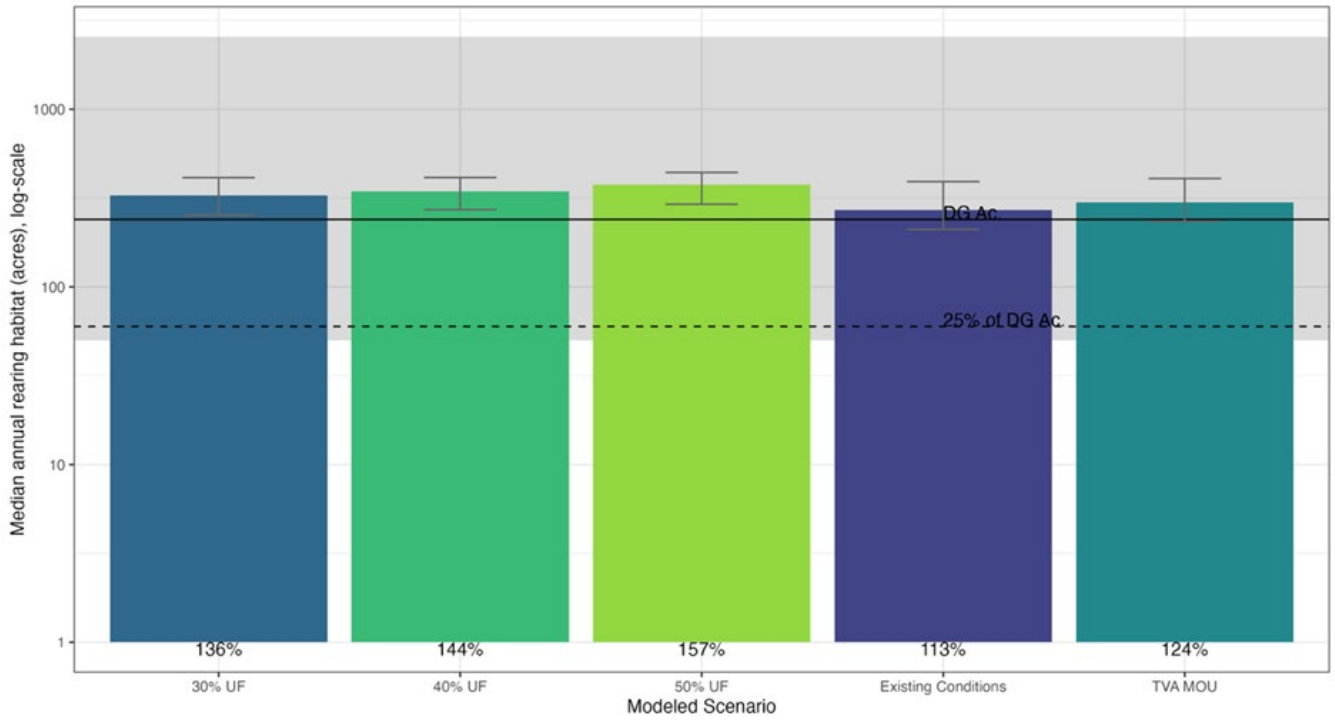
Temperature Filtered Habitat



Scenario	No temperature filter: Median estimated acres	Temperature filter: Median estimated acres	Temperature filter: Percent of doubling goal acreage
30% UF	133 (27, 294)	129 (20, 284)	54%
40% UF	143 (55, 289)	140 (48, 282)	58%
50% UF	194 (91, 320)	192 (84, 314)	80%
Existing Conditions	84 (0, 274)	84 (0, 271)	35%
TVA	101 (19, 295)	98 (18, 287)	41%

Combined Rearing Habitat

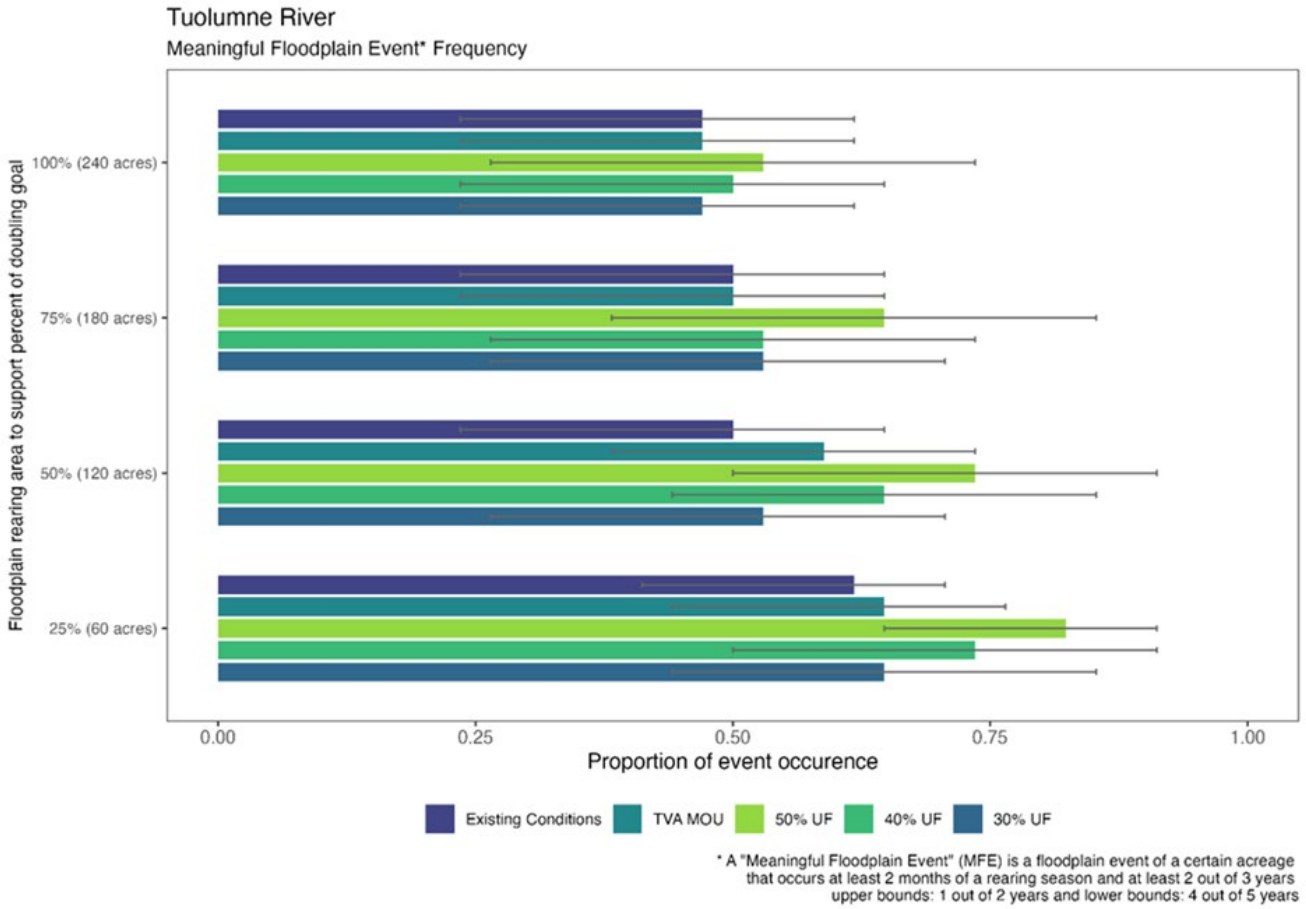
Temperature Filtered Habitat



Scenario	No temperature filter	Temperature filter	
	Median estimated acres	Median estimated acres	Percent of doubling goal acreage
30% UF	359 (326, 429)	327 (255, 412)	136%
40% UF	358 (325, 422)	344 (272, 412)	144%
50% UF	379 (333, 448)	376 (292, 440)	157%
Existing Conditions	389 (371, 439)	271 (211, 391)	113%
TVA	386 (365, 463)	298 (234, 407)	124%

Meaningful Floodplain Event

Temperature Filtered Habitat



	Temperature filter			
	Percentage of Doubling Goal Supported			
Scenario	**25%**	**50%**	**75%**	**100%**
30% UF	0.65 (0.44, 0.85)	0.53 (0.26, 0.71)	0.53 (0.26, 0.71)	0.47 (0.24, 0.62)
40% UF	0.74 (0.5, 0.91)	0.65 (0.44, 0.85)	0.53 (0.26, 0.74)	0.5 (0.24, 0.65)
50% UF	0.82 (0.65, 0.91)	0.74 (0.5, 0.91)	0.65 (0.38, 0.85)	0.53 (0.26, 0.74)
Existing Conditions	0.62 (0.41, 0.71)	0.5 (0.24, 0.65)	0.5 (0.24, 0.65)	0.47 (0.24, 0.62)
TVA	0.65 (0.44, 0.76)	0.59 (0.38, 0.74)	0.5 (0.24, 0.65)	0.47 (0.24, 0.62)

Conclusions

- Native anadromous salmonid populations have greatly declined in the Tuolumne River
- The T-HRL flow commitments are predicted to provide annually 2–12 TAF of new flow in the Tuolumne River and 7–17 TAF of new Delta outflow January to June
- T-HRL flow commitments are predicted to generally improve water temperatures during Chinook salmon juvenile rearing months March to May, with significant improvements expected in May

Conclusions

- T-HRL non-flow commitments include in-channel and floodplain restoration to increase or improve juvenile rearing or spawning habitat in addition to other actions like predator control
- T-HRL's combination of flow and non-flow actions are predicted to increase temperature filtered suitable habitat for salmonids
  - 14% increase in spawning habitat
  - 8% increase in in-channel juvenile rearing habitat
  - 17% increase in floodplain juvenile rearing habitat
- Analyses based on retrospective comparative modeling which has large uncertainties, robust monitoring and assessment would be needed to evaluate actual effects of the T-HRL

Next Steps

- Public written comments due by 12:00 p.m. (noon) on Friday, November 7, 2025
- Submit revised T-HRL SBR to independent scientific peer review in 2026
- Finalize the T-HRL SBR
- Complete process to consider amendments to the Bay-Delta Plan to incorporate the Tuolumne HRL proposal

How to Stay Informed

Related Websites

Bay-Delta Home:
www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/

LSJR/Southern Delta Salinity:
www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/bay_delta_plan/water_quality_control_planning/

Voluntary Agreements:
www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/proposed_voluntary_agreements.html

Contact Staff:

LSJR/Southern Delta Salinity:

LSJR-SD-Comments@waterboards.ca.gov

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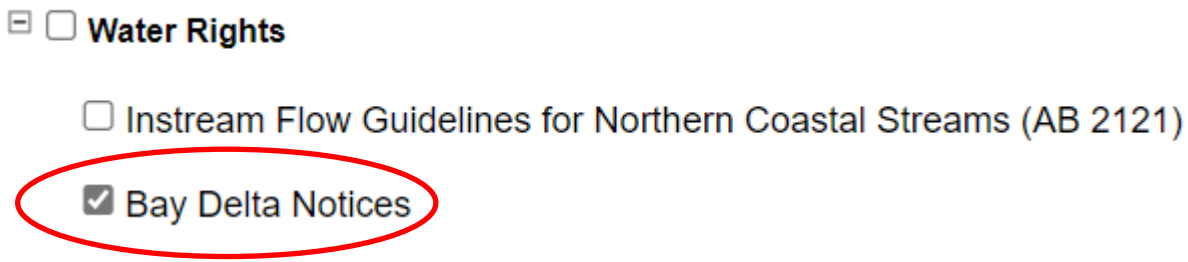

Questions?

Department of Water Resources
Erik Loboschefsky

Tribal Representatives or Elected Officials

Panel Presentations

- Panel 1
  - Tuolumne River Parties – General Managers
- Panel 2
  - Tuolumne River Parties – Technical Staff
- Panel 3
  - San Francisco Baykeeper
  - Friends of the River
- Panel 4
  - Yosemite Rivers Alliance (formerly Tuolumne River Trust)
  - California Sportfishing Alliance
  - Golden State Salmon Association

Public Comments

Board Member Discussion