Public Workshop
2nd Revised Draft Initial Biological Goals

for the Lower San Joaquin River Bay-Delta Plan Implementation

CALIFORNIA
Water Boards

Division of Water Rights, May 3, 2023, Item #9

Agenda

- Introduction
- Staff Presentation
  - Background
  - Principles for the Development of Biological Goals
  - Biological Goals
- Public Comments
- Next Steps

Background

- Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta Plan)
- 2018 Update - Lower San Joaquin River (LSJR) Flows
  - **February – June:** narrative & numeric objectives
  - **Tributary Flows:** 40 percent of unimpaired flow, adaptive range of 30 – 50 percent, from each of the Stanislaus, Tuolumne, and Merced Rivers
  - **Minimum Base Flow:** 1,000 cfs, adaptive range of 800 – 1,200 cfs on LSJR at Vernalis
- Program of Implementation for LSJR flows
  - Stanislaus, Tuolumne, and Merced (STM) Working Group
  - Biological Goals
- 2019 – Draft Biological Goals released for public comment
- 2022 – Revised Draft Initial Biological Goals released for public comment
  - August 4, 2022, Technical Workshop
- 2023 – 2nd Revised Draft Initial Biological Goals released for public comment

Background

- 2018 Bay-Delta Plan: requires biological goals for LSJR salmonids
- Biological Goals
  - Quantitative metrics to assess progress toward achieving fish and wildlife narrative objectives, including complementary activities in the watershed e.g., hatchery reforms, habitat restoration, or predator reduction
  - Used to inform: adaptive methods, San Joaquin River Monitoring and Evaluation Program, evaluation of effectiveness of program of implementation, and future changes to Bay-Delta Plan
  - Biological Goals not intended to assess water right holders' compliance with the Bay-Delta Plan
- Stanislaus, Tuolumne, and Merced (STM) Working Group
  - STM Working Group established to assist with the implementation, monitoring, and effectiveness assessment of LSJR flows
  - Board will seek recommendations on biological goals from STM and others
  - Four STM Working Group meetings from November 2022 – April 2023

Background – STM Working Group

- California Department of Fish & Wildlife
- Central Sierra Environmental Resource Center
- Department of the Interior, US Bureau of Reclamation
- Merced Irrigation District
- Merced River Conservation Committee
- Modesto Irrigation District
- National Marine Fisheries Service
- Oakdale Irrigation District
- San Francisco Baykeeper
- San Francisco Public Utilities Commission
- Santa Rosa Rancheria Tachi Yokut Tribe
- South San Joaquin Irrigation District
- Stanford University
- State Water Board
- Stockton East Water District
- The Nature Conservancy
- Tuolumne Utilities District
- Tuolumne County Water Agency
- Turlock Irrigation District
- US Fish & Wildlife Service
- Unaffiliated – William Martin
- Unaffiliated – Richard Morat
- Valley Water

Principles for the Development of Biological Goals

- Science-based
- Existing legal requirements (Central Valley Project Improvement Act, Fish and Game Code, and Bay-Delta Plan salmon protection objective)
- **S**pecific, **M**easurable, **A**chievable, **Q**uantitative, **R**esults-focused, **T**ime-bound (SMART)
- Goals were developed to assess Viable Salmonid Population (VSP) parameters
- Goals were specifically developed for LSJR salmon as an indicator of watershed health

Principles for the Development of Biological Goals

- 2019 Delta Science Program Independent Science Advisory Panel (ISAP) Report
- Other efforts to develop biological goals (Scientific Evaluation Process, Bay-Delta Conservation Plan efforts, Collaborative Science and Adaptive Management Program efforts)
- Goals will be reassessed as additional information is collected using an adaptive management approach, at least every 5 years

Initial Biological Goals for Fall-run Chinook Salmon

- VSP Parameters: Key indicators of salmon population viability
  - Abundance: Escapement
  - Productivity: Cohort Replacement Rates, Juvenile Survival, Juvenile Production
  - Diversity: Proportion of Hatchery Origin Spawners, Emigration Timing, Emigration Size Classes
  - Spatial Structure: Population Distribution

Role of Biological Goals

Table 1.1. Role and Use of Biological Goals

Role of Biological Goal	Biological Goal/Goal Component
Approving adaptive implementation adjustments due to expected or documented achievement, or furtherance of achievement, of goals, including: • Change in required percent of unimpaired flow within the range of 30– 50% • Alternative flow schedule based on total 5-month volume equal to the required percent of unimpaired flow (flow budget) • Shift some of the flow budget to July– January	• Juvenile egg to confluence survival • Juvenile emigration timing at tributary confluence • Juvenile size class migration at tributary confluence • Juvenile production at tributary confluence
Inform potential water diversion, water right, water quality, or other actions in the mainstem San Joaquin River and Delta to protect flows and habitat provided by LSJR flows or actions by other entities in furtherance of achieving the LSJR narrative flow or salmon protection objectives	• Juvenile LSJR survival at Mossdale • Juvenile survival Mossdale to Chipps Island • Juvenile egg to confluence survival
Inform adaptive methods to the extent that ability to reach goals is related to adaptive methods	• All biological goals
Evaluate effectiveness of program of implementation	• All biological goals
Evaluate effectiveness of SJRMEP	• All biological goals
Inform future changes to the Bay-Delta Plan	• All biological goals

Abundance

- Population abundance is an important determinant of risk, and large populations have lower risk of extinction and are more resilient
- Based on escapement numbers (i.e., fish that return to reproduce)
- Escapement goals are quantitatively linked to the productivity goals and the salmon protection objective
- Only includes contributions of natural origin spawner escapement

Abundance Goal

Table 3.1. LSJR Fall-Run Chinook Salmon Escapement Goals

River	Escapement Goal, measured as a 5-Year Running Average	Progress Assessment/Attainment Target
All	Positive generational trend in escapement, measured as a 5-year geometric mean	Assessed annually/when numeric abundance goals are met
Stanislaus River	7,800	Assessed annually/Year 15 achieve the goal
Tuolumne River	15,500	Assessed annually/Year 25 achieve the goal
Merced River	7,300	Assessed annually/Year 15 achieve the goal

Productivity

- The population growth rate of a species and an indicator of how well the population replaces itself

- Full life cycle
  - Cohort Replacement Rate (CRR)

- Juvenile productivity
  - Juvenile survival
  - Juvenile production

Productivity Goal

Table 3.2. LSJR Fall-Run Chinook Salmon Full Life Cycle Productivity Goals

Productivity Metric	Goal, measured as a 5-year geometric mean	Progress Assessment/Attainment Target
CRR Trend	Positive generational trend until a CRR > 1 is met	Assessed annually/when numeric productivity goals are met
Pre-Fishing CRR	Pre-Fishing CRR > 1 and > post-fishing CRR until abundance goals met and then sustained	Assessed annually/Year 10, achieve the goal
Post-Fishing CRR	Post-Fishing CRR > 1 until abundance goals met and then sustained CRR > 1	Assessed annually/Year 10, achieve the goal

Productivity Goal

Table 3.3. LSJR Fall-Run Chinook Salmon Juvenile Survival Goals

Productivity Metric	Goal, measured as a 5-year geometric year	Progress Assessment/ Attainment Target
Juvenile Productivity Trend	Positive trend in juvenile survival until abundance goal is met, measured as a 5-year geometric mean	Until numeric abundance goals are met (Year 15)
Freshwater juvenile Survival (egg to Chipps Island)	≥ 1.5%	Assessed annually/Year 5, achieve the goal
LSJR at Mossdale to Chipps Island (Through-Delta) Survival (SJDS)	≥ 20%	Assessed annually/Year 5, achieve the goal
Egg to tributary confluence with LSJR	≥ 10%	Assessed annually/Year 5, achieve the goal

Productivity Goal

Table 3.4. LSJR Fall-Run Chinook Salmon Juvenile Production Goals

Productivity Metric	Goal Per cohort year	Progress Assessment/ Attainment Target
Stanislaus River		
Confluence Juvenile Production	2,700,000	Assessed annually on an ongoing basis
Delta exit (Chipps Island) Juvenile Production	400,000	Assessed annually on an ongoing basis
Tuolumne River		
Confluence Juvenile Production	4,700,000	Assessed annually on an ongoing basis
Delta exit (Chipps Island) Juvenile Production	700,000	Assessed annually on an ongoing basis
Merced River		
Confluence Juvenile Production	2,200,000	Assessed annually on an ongoing basis
Delta exit (Chipps Island) Juvenile Production	300,000	Assessed annually on an ongoing basis

Diversity

- The variations in a population that help ensure its survival by contributing to its stability, resilience, and persistence
- More diverse populations are at less risk of extinction, for example from habitat and climate changes
- Initial biological goals include two types:
  - Genetic Diversity
  - Life History Diversity

Genetic Diversity Goal

Table 3.8. LSJR Fall-Run Chinook Salmon pHOS Genetic Diversity Goals for the LSJR Basin

Genetic Diversity Metric	Goal, measured as a 5-year running average	Progress Assessment/Attainment Target
pHOS	Decreasing trend, as a 5-year running average	Assessed annually/when the genetic diversity goal is met
pHOS	≤ 15%	Assessed annually/Year 12 after beginning of implementation
pHOS	≤ 10%	Assessed annually/Year 21 after beginning of implementation

Life-History Diversity Goal

Table 3.9. LSJR Fall-Run Chinook Salmon Juvenile Emigration Timing Goals

Juvenile Size Class* (Phenotype)	Positive Detection Each Week near Mouth of Each Tributary	Progress Assessment/ Attainment Target
Fry	Last week of January to second week of April	Assessed annually/Year 10, achieve the goal
Parr	First week of February to last week of May	Assessed annually/Year 10, achieve the goal
Smolt	Third week of February – first week of June	Assessed annually/Year 10, achieve the goal

*Size classes are defined as fry < 55 millimeters (mm); parr 55 - 75 mm; smolt >75 mm

Life-History Diversity Goal

Table 3.10. LSJR Fall-Run Chinook Salmon Minimum Percentage for Different Size Classes* at Migration Goals for different water-year types. These are measured as 3-year running averages at the mouth of each tributary.

Wet and Above Normal WYs	Below Normal, Dry, and Critical WYs	Progress Assessment/Attainment Target
Fry ≥ 20%	Fry ≥ 20%	Assessed annually/Year 12, achieve the goal
Parr ≥ 20%	Parr ≥ 30%	Assessed annually/Year 12, achieve the goal
Smolt ≥ 10%	Smolt ≥ 20%	Assessed annually/Year 12, achieve the goal

* Size classes are defined as fry < 55 millimeters (mm); parr 55 - 75 mm; smolt >75 mm

Spatial Structure

- Broad geographic distribution of populations or individuals in a population
- Reduces chance of catastrophic loss, facilitates recolonization, and buffers population from future environmental change
- Decreases extinction risk

The initial spatial structure biological goal in the LSJR is to achieve the abundance, productivity, and diversity goals on all three LSJR tributaries, the Stanislaus, Tuolumne, and Merced rivers

Initial STM Feedback

- Roles: Biological goals should not be limited in their roles and uses
- Abundance Goal: Objections to the use of escapement - goals should reflect the attainment of the Plan's objective, e.g., ocean production or juvenile abundance
- Productivity Goal: The juvenile freshwater survival goal is too low and does not represent viability
- Abundance and Productivity Goals: Encouraged at the revised escapement goals, but both the escapement and juvenile production goals still lack considerations for density dependence, i.e., the Stanislaus River has a maximum carrying capacity below goals

Carrying Capacity

SAN FRANCISCO ESTUARY & WATERSHED SCIENCE VOLUME 17, ISSUE 1, ARTICLE 4

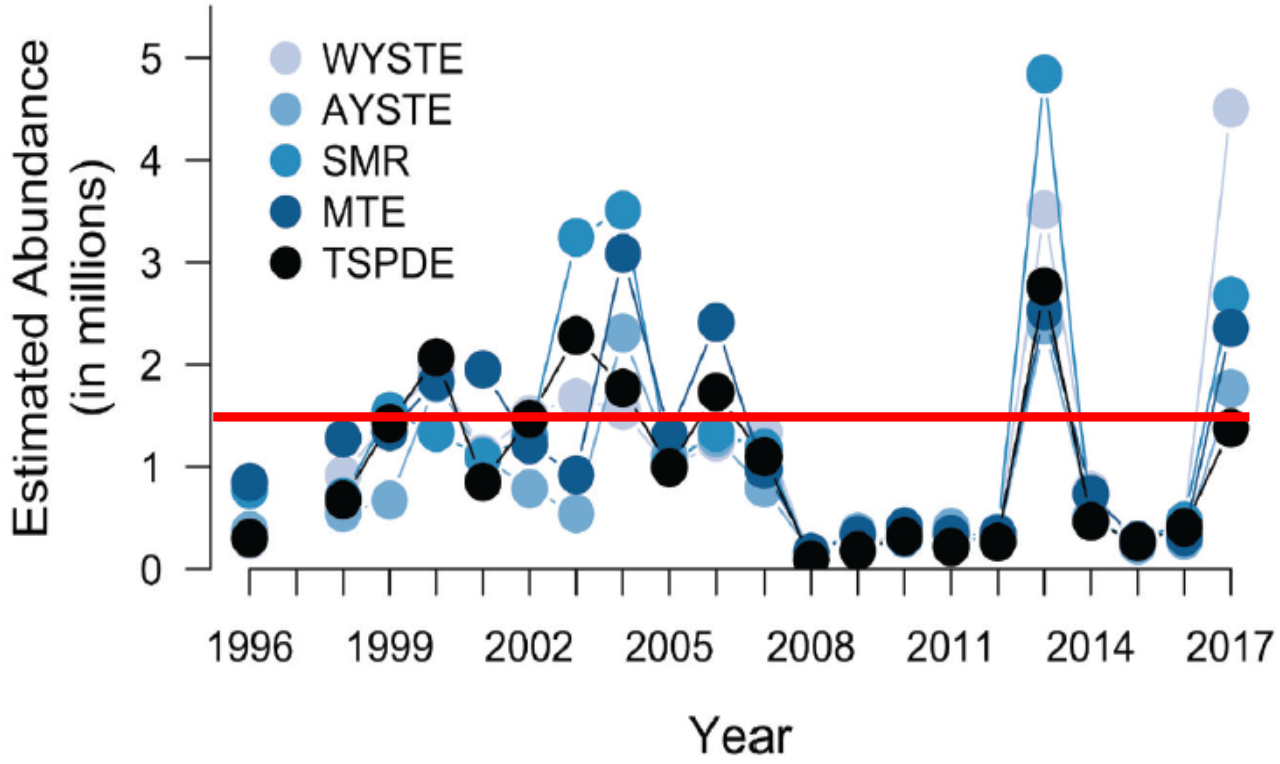
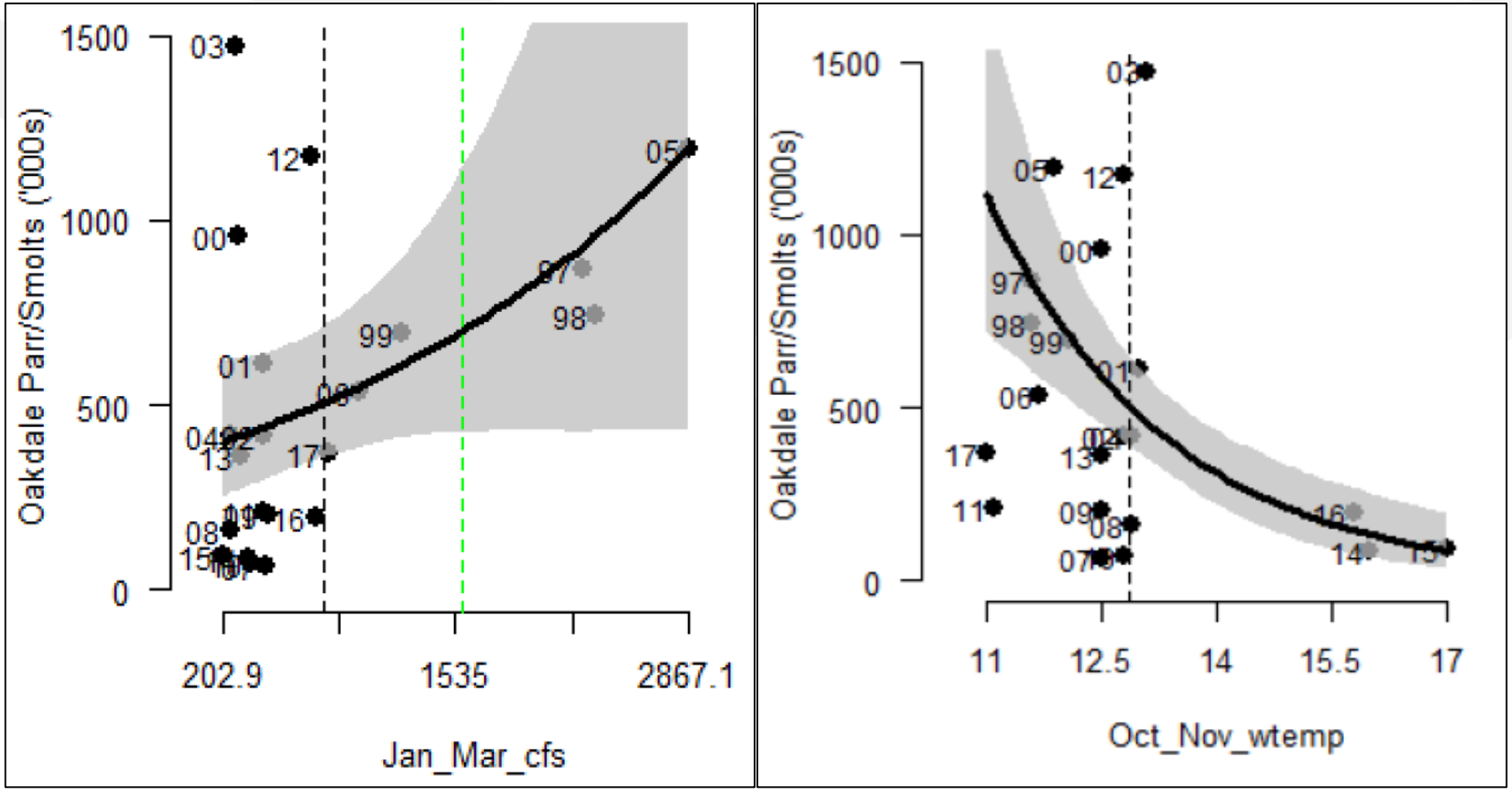


Figure 4 Point estimates of annual juvenile salmon abundance at the Oakdale RST from 1996 to 2017. Colors represent the different estimation methods; within-year stratified trap efficiency (WYSTE), among-year stratified trap efficiency (AYSTE), stratified mark-recapture (SMR), modeled trap efficiency (MTE), and the Bayesian tim++e-stratified Petersen diagonal recaptures experiments (TSPDE). Error bars are not shown, for ease of visualization, but are provided in Figure 3. Note that no trapping was performed in 1997.

More than 24% of years have greater than 1.5 million juvenile salmon migrating past the Oakdale rotary screw trap.

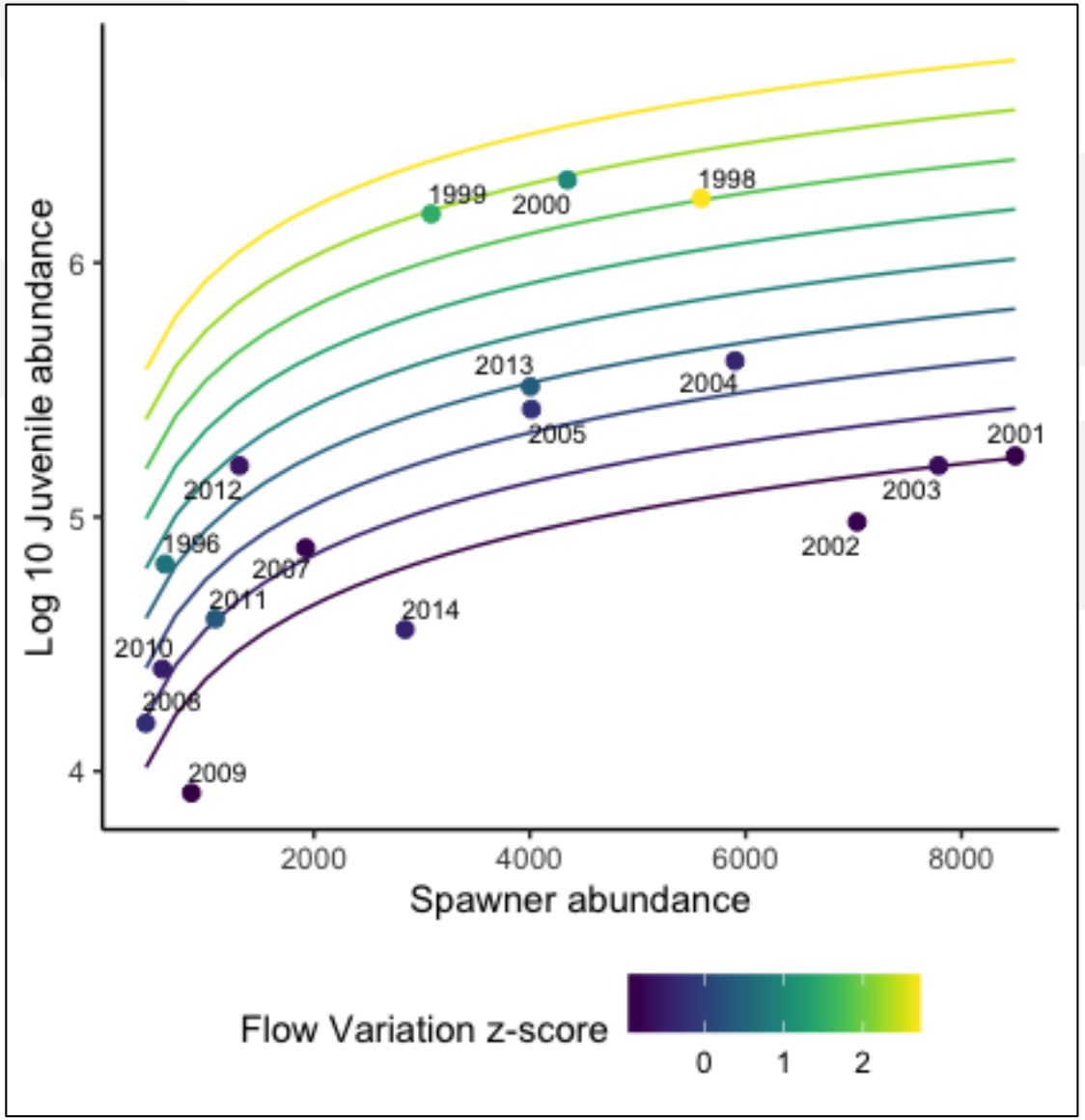
Pilger et al. 2019. Evaluation of Long-term Mark-Recapture Data for Estimating Abundance of Juvenile Fall-run Chinook Salmon on the Stanislaus River from 1996 to 2017. Redline added to figure at ~ 1.5 million.

Flow and Temperature Mediated Carrying Capacity



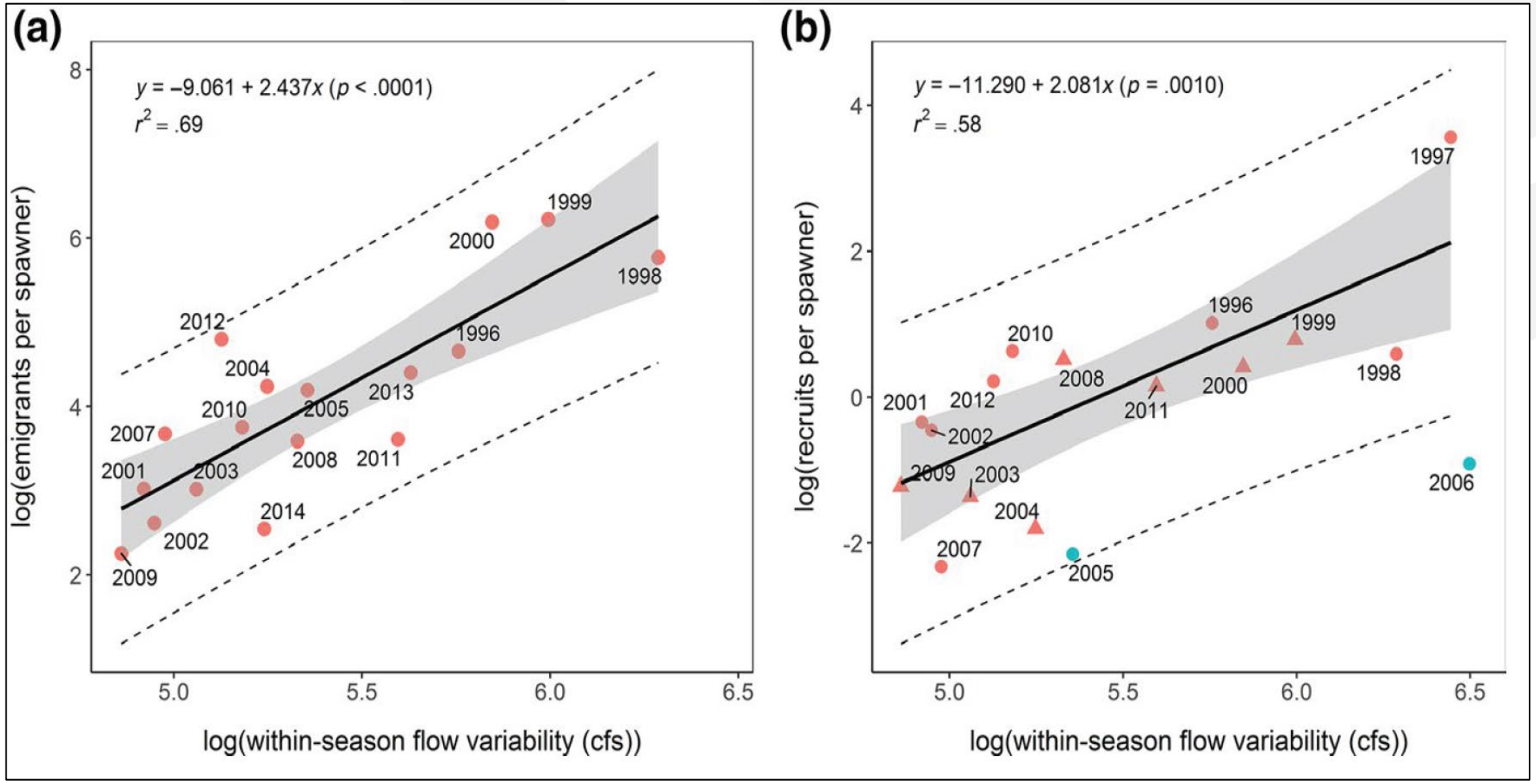
ISAP 2019

Flow Mediated Carrying Capacity



Biological Goals Report

Flow Mediated Carrying Capacity



Sturrock et al. 2019

Discussion

Next Steps

- Written comments on the 2nd Revised Draft Initial Biological Goals Report due May 12, 2023
- Release Draft Final Initial Biological Goals Report
- Board Meeting consideration of approval (anticipated in summer 2023)

Closing