Workshop Summary: Monitoring Steelhead Populations in the San Joaquin Basin

Impetus

The goal of this workshop was to identify collaborations and partnerships that could contribute to the future development of comprehensive monitoring of San Joaquin Basin *Oncorhynchus mykiss*. This workshop supported the Biological Opinion on Long-Term Operation of the CVP and SWP (https://www.fisheries.noaa.gov/resource/document/biological-opinion-reinitiation-consultation-long-term-operation-central-valley) 3.6.2, which aims to develop a plan to monitor steelhead populations within the San Joaquin Basin and/or the San Joaquin River downstream of the confluence of the Stanislaus River, including steelhead and rainbow trout on non-project San Joaquin tributaries.

Planning Committee

The planning committee held nine 90-minute meetings roughly biweekly beginning in September 2020 and ending in January 2021. The planning committee consisted of fourteen people from eight organizations (Table 1). Each participant was invited by the founding members, Josh Israel and Louise Conrad. Bruce DiGennaro was invited to moderate the workshop and participate as a representative of the Collaborative Adaptive Management Team (CAMT). The planning committee set workshop objectives, formulated breakout discussion questions, wrote fact sheets, invited presenters, gave presentations, and participated as breakout discussion facilitators. The Delta Stewardship Council's (DSC) External Affairs and Communications and Information Technology divisions posted relevant material to the DSC event webpage and listserv as well as managed the Microsoft Teams platform and calendar invitations.

Workshop Timeline:

Planning Committee Meeting 1: September 24, 2020
Planning Committee Meeting 2: October 7, 2020
Planning Committee Meeting 3: October 22, 2020
Planning Committee Meeting 4: November 3, 2020
Planning Committee Meeting 5: November 18, 2020

Listserv Announcement – Save the Date and Registration: November 23, 2020
Planning Committee Meeting 6: December 2, 2020
Planning Committee Meeting 7: December 17, 2020
Planning Committee Meeting 8: January 12, 2021
Listserv Announcement – Agenda: January 19, 2021
Mural training: January 22, 2021
Planning Committee Meeting 9: January 27, 2021
Listserv Announcement – Registration reminder: February 2, 2021
Registration closed: February 8, 2021
Registration confirmation and fact sheet announcement: February 9, 2021
Microsoft Teams invitation: February 10, 2021
Facilitator & note taker training: February 11, 2021
Workshop: February 17, 18, and 19, 2021
Workshop videos posted: February 22, 2021

Table 1. Planning committee members.

Agency/Organization	Name
US Bureau of Reclamation	Michael Beakes
NOAA Fisheries	Howard Brown
The Metropolitan Water District of Southern CA	Alison Collins
Delta Science Program	Louise Conrad
Delta Science Program	Henry DeBey
Essex Partnership	Bruce DiGennaro
Delta Science Program	Theodore Flynn*
Delta Science Program	Pascale Goertler
US Bureau of Reclamation	Joshua Israel
CA Dept. of Fish & Wildlife	Ryon Kurth
US Fish & Wildlife Service	Jeffrey Mclain
CA Dept. of Fish & Wildlife	Jonathan Nelson
The Metropolitan Water District of Southern CA	Corey Phillis
CA Dept. of Water Resources	Kevin Reece

* Ted Flynn is now employed by the CA Dept. of Water Resources

Fact Sheets

Topics and authors for relevant fact sheets were chosen by the planning committee. These documents were written over a period of six weeks, reviewed by the planning committee, given consistent formatting by DSC Communications, made compliant with the Americans with Disabilities Act by DSC staff (Rachael

Klopfenstein and Lynn Takata), and published on the DSC's event webpage on February 8, 2021. The suggested citation and links to the four fact sheets are:

- Israel, J., Brown, H. and Conrad L. 2021. Workshop Objectives and Regulatory Background. *In* Monitoring Steelhead Populations in the San Joaquin Basin. *Edited by* Delta Science Program - Stewardship Council, Joint Delta Science Program – U.S. Bureau of Reclamation Workshop, Sacramento, CA. DOI: 10.13140/RG.2.2.33390.33606 (https://deltacouncil.ca.gov/pdf/science-program/fact-sheets/2021-02-03-monitoring-steelhead-populations-workshop-objectives-and-regulatory-background.pdf)
- Beakes, M., Bilski, R., Mattias, B., Byrne, B., Vick P. and Goertler P. 2021 Oncorhynchus mykiss Monitoring and Research Gap Analysis. *In* Monitoring Steelhead Populations in the San Joaquin Basin. *Edited by* Delta Science Program - Delta Stewardship Council, Joint Delta Science Program – U.S. Bureau of Reclamation Workshop, Sacramento, CA. DOI: 10.13140/RG.2.2.29383.21927 (https://deltacouncil.ca.gov/pdf/science-program/fact-sheets/2021-02-03-monitoring-steelhead-populations-monitoring-and-research-gap-analysis.pdf)
- Beakes, M. and Phillis, C. 2021. Life-History Variation in Oncorhynchus mykiss. *In* Monitoring Steelhead Populations in the San Joaquin Basin. *Edited by* Delta Science Program - Delta Stewardship Council, Joint Delta Science Program – U.S. Bureau of Reclamation Workshop, Sacramento, CA. DOI: 10.13140/RG.2.2.15438.79685 (https://deltacouncil.ca.gov/pdf/science-program/fact-sheets/2021-02-04-monitoring-steelhead-populations-life-history-variation.pdf)
- Ellrott, B., Brown H. and Johnson, R. California Central Valley Steelhead Distinct Population Segment. *In* Monitoring Steelhead Populations in the San Joaquin Basin. *Edited by* Delta Science Program - Delta Stewardship Council, Joint Delta Science Program – U.S. Bureau of Reclamation Workshop, Sacramento, CA. DOI: 10.13140/RG.2.2.30997.04329 (https://deltacouncil.ca.gov/pdf/science-program/fact-sheets/2021-02-04-california-central-valley-steelhead-distinct-population-segment-factsheet.pdf)

Registration

254 people from 72 different institutions registered for the meeting. The largest blocs of registrants were state (79) and federal (73) employees (Figure 1). Most

registrants who reported relevant expertise described themselves as experienced steelhead scientists (Figure 2) with backgrounds in steelhead monitoring (Figure 3).

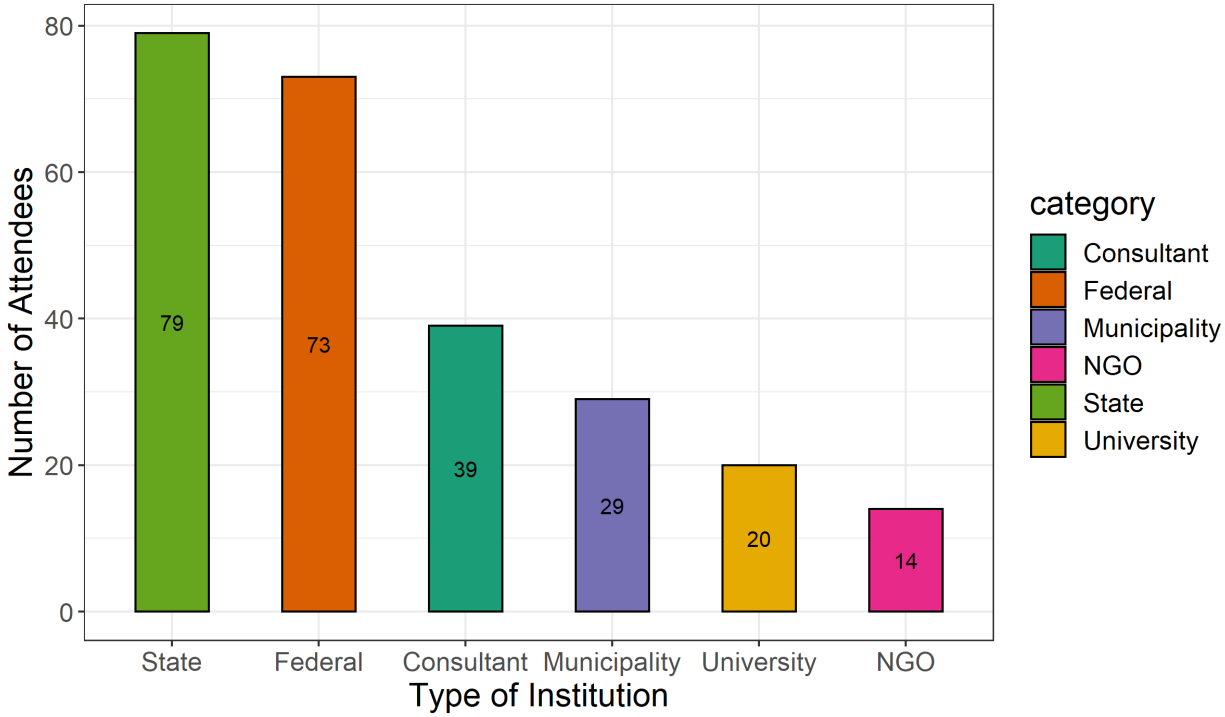

Figure 1. The number of registrants by institution type (top six are shown).

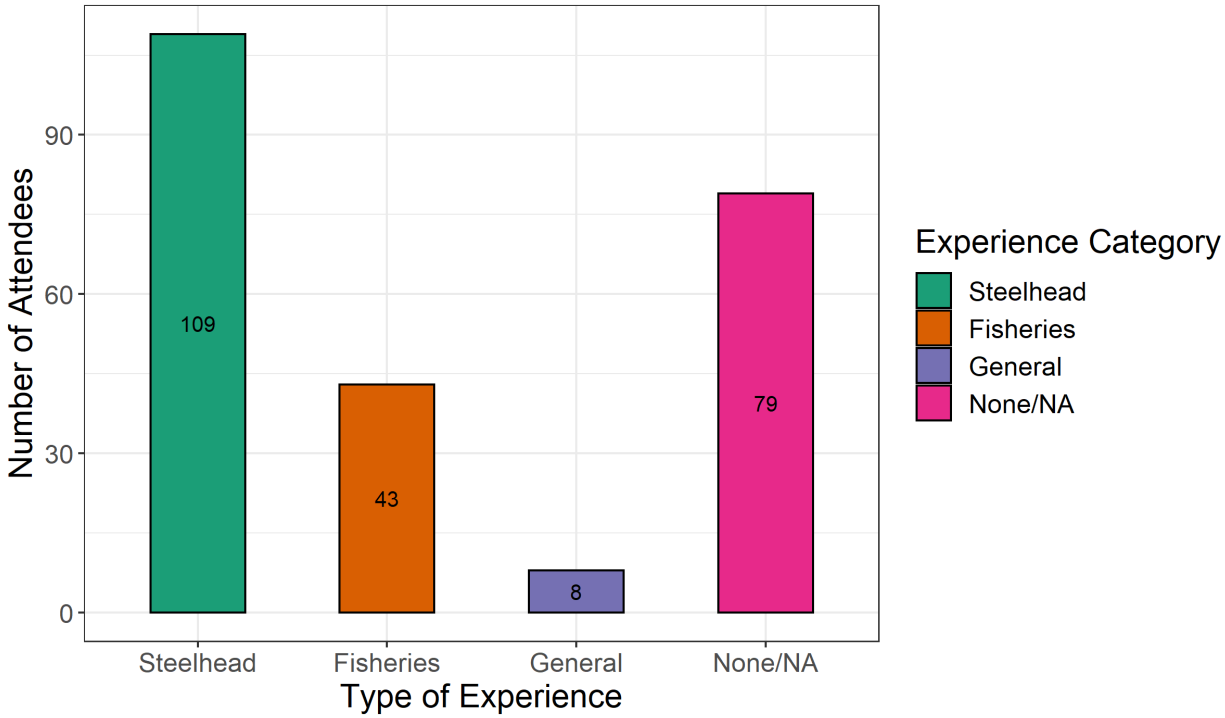

Figure 2. The relevant experience reported upon registration.

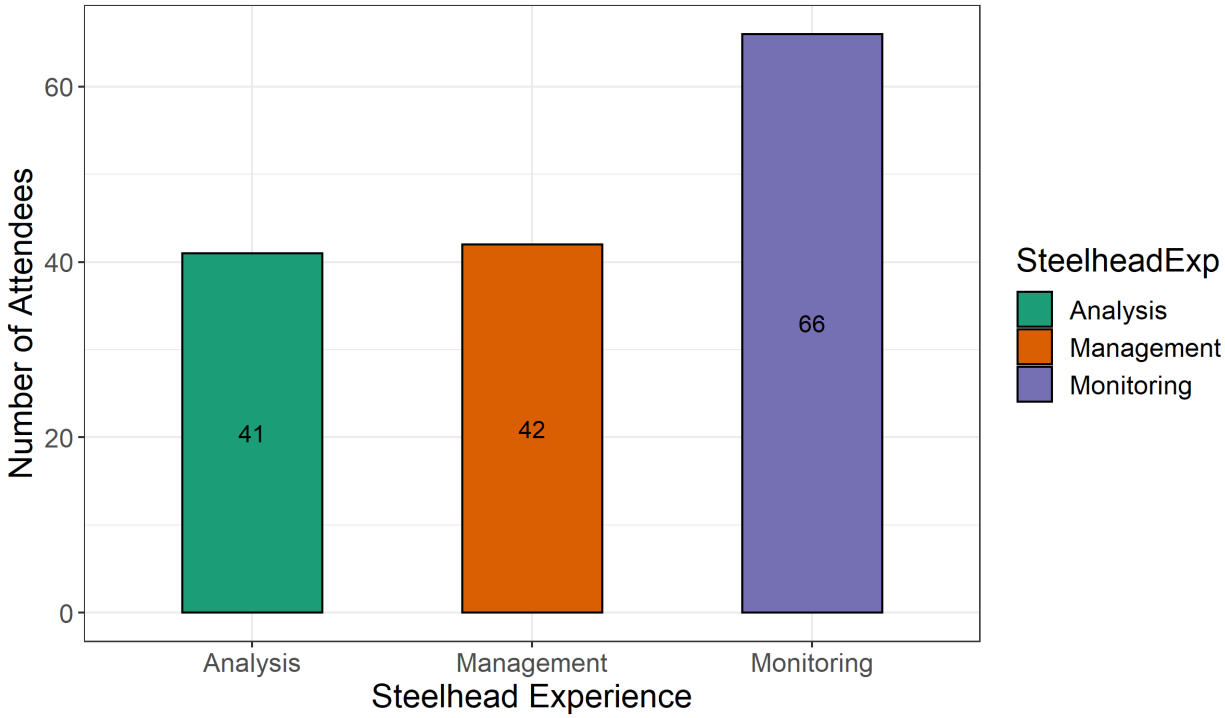

Figure 3. Within the group that reported steelhead experience upon registration the type of experience, further refined into categories: analysis, management, or monitoring. Some individuals reported experience in several categories.

Attendance

Online attendance via Microsoft Teams remained consistent throughout the workshop, ranging from 182 people on Day 1 (2/17/2021) to 162 people on Day 3 (2/19/2021). 173 people attended Day 2 (2/18/2021).

Presentations

Presentations were given from nine to eleven each morning. See this link to the agenda (https://deltacouncil.ca.gov/pdf/science-program/agenda/2021-01-15-steelhead-agenda.pdf) for more details on each presentation. Day 1 presentations (https://www.youtube.com/watch?v=bVurhXbRQ_o&list=PLqTHCliW1Hhqxr8j1i6DcUJsH5LHtPzpf) and Day 2 presentations (https://www.youtube.com/watch?v=DaqeF5SYS84&list=PLqTHCliW1Hhqxr8j1i6DcUJsH5LHtPzpf&index=2) of the workshop reviewed the management challenges and monitoring framework for *O. mykiss* and gave participants the opportunity to discuss historic and ongoing *O. mykiss* monitoring programs. For day 3

presentations (https://www.youtube.com/watch?v=2cZ5RHaX9UA&list=PLqTHCliW1Hhqxr8j1i6DcUJsH5LHtPzpf&index=3), participants explored analytical approaches for measuring the impact of management actions on San Joaquin Basin steelhead, identifying what information is necessary, how to gather that information, and what spatial and temporal extent is required.

Breakout Discussion Sessions

Breakout discussion sessions were held every afternoon from eleven thirty to twelve thirty. Attendees discussed the questions listed in the agenda in a virtual collaborative workspace using Microsoft Teams and Mural (https://www.mural.co/). Twenty workshop participants from eight organizations volunteered as breakout session facilitators and note takers (Table 2), for a total of ten pairs, one in each of the ten breakout sessions. Access to Mural and brainstorming templates were provided by DSC to aid in virtual collaborative interactions.

Table 2. Breakout discussion session facilitator and note taker pairs.

Facilitator	Note taker
Barbara Byrne	Henry DeBey
Monica Guiterrez	Daniel Martinez
Jeffrey Mclain	Eva Bush
Michael Beakes	Rafael Silberblatt
Joshua Israel	Rachael Klopfenstein
Bruce DiGennaro	Savanah Bell
Alison Collins	Kristie Okimoto
Terra Alpaugh	Page Vick
Jonathan Nelson	Sharon Hu
Mary Beth Day	William Foster

Key Takeaways from Breakout Discussion Sessions

Management Challenges (Day 1)

- Sampling Methodology
    - A diversity of approaches is needed (“Everything works sometimes, nothing works all the time”). There is a need for consistent sampling, but the same methodology may not work in all locations.
    - Management needs/decisions must be clear to tailor sampling methods and understand what data “messy-ness” is acceptable.

    - Existing methodology is sometimes well-suited for Chinook Salmon, but not necessarily Steelhead.
    - Variable life histories of Steelhead add complexity to the monitoring needs.
    - Sometimes the populations are small, making it necessary to put forth a lot of effort to detect the fish.
- Access
    - It can be difficult to gain access to all areas that are desirable for a monitoring framework; a lot of watershed area is on private land
    - There may be a mismatch between when quality data can be collected and when those data are needed.
    - Difficult to design permits for sampling both anadromous and resident life histories
- Funding
    - Need for sustained funding
    - Limited staff

Monitoring Framework (Day 2)

- There is a need for basin-wide coordination, such as:
    - Partnerships with multiple stakeholders
    - Clear reporting milestones
    - Sharing information on successful methodology
    - A centralized data repository and access to historical data
    - Standardization and/or consistency across the monitoring program and locations with an analytical framework to bridge different monitoring programs
- There are many data and analysis needs, such as:
    - The development of a life cycle model
    - Age structure
    - Ault abundance
    - Juvenile out-migration and out-migration survival
    - Efficiency estimates with an analytical framework to translate catch into abundance
    - Resident contribution to the anadromous spawner population
        - Understanding the hatchery influence on life history diversity
    - Movement and/or connectivity between rivers and hatcheries

    - Limiting environmental factors
        - Mortality bottlenecks
        - Thermal tolerance
        - Response to habitat restoration

Analytical Approaches to Measuring Management Actions (Day 3)

- Establish benchmarks and clear goals: including governance structure, funding, decision makers and legal authority.
- Design of research questions and analysis prior to data collection (risk aversion should not drive planning and work must be done to reduce uncertainties – hypothesis development and conceptual models).
- Fundamental information to improve knowledge and options for monitoring:
    - adult spawning populations (targeting steelhead not Chinook)
    - determining anadromy vs. residency
        - What is driving anadromy?
        - How variable is anadromy/those drivers across the landscape?
    - Juvenile production in core watersheds
        - Outmigration population
        - Smolt survival thresholds
        - Spatial distribution of juveniles
        - Effort estimates
- Synthesis of existing conditions. Characterize what we know.
- Coordination and communication: address inter-agency partnerships, goals, tasks, accomplishments, and data sharing.
- Enhance current monitoring:
    - Data prioritization with achievable and focused criteria
    - Life-stage specific monitoring
    - Standardization (complementary suite of gears with paired studies in different watersheds)
    - Adaptive framework with new technology

Digital Communication

The Council promoted the Workshop through its website (https://deltacouncil.ca.gov/), listserv (https://deltacouncil.ca.gov/latest-news), social media (Twitter, Facebook, and Instagram), and partner newsletters. Materials (e.g., a save the date flyer, registration web page, agenda, fact sheets, and video recording) were hosted on the event calendar web page

(https://deltacouncil.ca.gov/events) and were linked in three emails to the listserv, 38 tweets, five Facebook posts, and three Instagram posts. The event hashtag, #steelheadworkshop, was consistently applied across materials that were distributed before, during, and after the Workshop – creating a digital catalog of social media posts shared by the Council, staff, attendees, and enthusiasts. While some attendees used the hashtag during the Workshop, most communicated primarily through Microsoft Teams' chat and Mural.

Next Steps

- Reconvene agency members that assisted with the Long-Term Operations non-flow action steelhead charter to discuss workshop scope/context. Discuss how workshop content can inform (2021):
    - Steelhead life-cycle monitoring on Sacramento tributary CVP/SWP watershed
    - The San Joaquin Basin Monitoring Plan
- Draft San Joaquin Basin Monitoring Plan incorporating workshop breakout session content and feedback. Will leverage through review of Murals and key takeaways to aid in brainstorming by Monitoring Plan writing team (2021-2022).
- Continue communication with workshop participants on what next steps are and any products produced that utilized information gained in the workshop. Consider future efforts to keep participants engaged, informed, and continue to solicit ideas and feedback on the monitoring plan (2021-2024).
- Consider and scope a potential manuscript capturing elements of the workshop (e.g., factsheets, breakout discussions, and knowledge gaps highlighted by workshop). This may be included within the gap analysis manuscript (2021-2022).
- 2024 Independent Review Panel evaluation of steelhead monitoring.