Technical Memo

Task 2. Mossdale Spring Trawl

Introduction

Background: The Mossdale trawl is a long-term monitoring project in the San Joaquin River that monitors salmonid outmigration and juvenile fish populations. It is currently a collaborative effort between the California Department of Fish and Wildlife (CDFW) and United States Fish and Wildlife Service (USFWS). In its current design, each organization is responsible for sampling three months individually, and six months together. This design ensures resources and sampling efforts are shared equally between the two agencies and helps mitigate potential sample bias. To better coordinate, CDFW and USFWS hold monthly meetings to address changing river conditions, logistics, and resolve differences between the two agencies.

Purpose: This project also enumerates steelhead (*Oncorhynchus mykiss*) emigrating through the South Delta; and is helping develop methods for to differentiate between juvenile fall and spring-run Chinook salmon. In addition, data collected during the survey is used by CDFW and USFWS to inform water management decisions in the San Joaquin River Basin. (IEP 2024). This project also provides data supporting water management in the San Joaquin River basin and the Delta; and is used for enumerating steelhead (*O. mykiss*) migrating through the San Joaquin River into the south Delta. Developing methods to differentiate fall and spring run juvenile Chinook salmon migrating in the San Joaquin River basin.

Objectives

1. Determine annual salmon smolt production in the San Joaquin Basin.
2. Develop smolt production trend information.
3. Determine the timing and magnitude of smolt out-migration into the Delta from the San Joaquin tributaries.
4. Collect Steelhead smolt migration timing in the San Joaquin Basin.
5. Develop Steelhead production and trend information.
6. Evaluate the survival rate of hatchery fish at various points in the system.
7. Document the occurrences of other species of interest including listed species.

Methods

Study Area: The survey area is located in the State of California, San Joaquin County, section/township/range: 4/02S/06E and 33/01S/06E. The sample reach is located approximately 2 river miles downstream of Mossdale Crossing Regional Park on the San Joaquin River. See Appendix for a detailed map.

Sampling Methods: Net & Live Box

The Mossdale Trawl is conducted by towing a Kodiak trawl net between two vessels: a net boat and a chase/workup boat. The net used for the survey is approximately 20 meters long and composed of five panels, each with a decreasing mesh size the closer it gets to the live box at the cod end. The mesh size for each panel ranges from 5.1 cm stretch at the mouth to 0.3 cm stretch just before the live box. The fully extended mouth size of the net is 1.83 x 7.62 m rectangle.

The live box (34 cm wide x 34 cm tall x 51 cm long) is composed of 0.18 cm thick aluminum that is perforated with numerous 0.46 cm diameter holes. The live box contains several internal baffles to minimize fish mortality and stress due to flow pressure.

A float line and lead line enable the net to remain in the top few meters of the water column while sampling. In addition, at the front of each wing of the net is a 1.83 m spreader bar with floats at the top and weights at the bottom to keep depth constant while sampling. The net is connected to the boats using a 1.83 m rope bridle attached to a 15.24 m tow rope on each side of the net. As a result, the net is fished approximately 16 m from the boats. For additional details, please see the Mossdale Trawl Standard Operating Procedures.

CDFW conducts up to 15 20-minute tows, 3-to-5 days per week during April, May and June. In the months of January, February, March, July, August and September, CDFW, in conjunction with USFWS, conducts 10 20-minute tows, During the months of coordination, we meet with USFWS once per month to coordinate and discuss logistics, vehicles or boats usage, staff conflicts and resolve any monitoring differences.

Data Collection: Data is recorded on paper datasheet in the field. All data are entered into a relational database for processing and are shared through SacPAS. [https://www.cbr.washington.edu/sacramento/data/juv_monitoring.html]

Data Analysis: Juvenile salmon production is estimated using three different methods:

1. Smolt production index calculation,
2. Vulnerability expansion estimate (single Year),
3. Vulnerability expansion estimate (multi-years).

For detail about data analysis, please see the Mossdale Trawl Standard Operating Procedures.

Results

Between July 1, 2023, and September 30, 2023, CDFW collaborated with USFWS to perform the survey. CDFW assisted USFWS by providing two staff members for the three-day sampling week. From September 30, 2023, to December 31, 2023, USFWS took over sampling full-time. During this time, CDFW prepared their sampling gear for

the next sampling period. This included coordinating a lease renewal for vessel storage, repairing nets, maintaining and calibrating scientific sampling equipment, purchasing necessary equipment, and working with fleet repair vendors to maintain vessels, trailers, and vehicles.

Beginning January 1, 2024, CDFW resumed its collaborative survey efforts with USFWS. Weather conditions during the winter presented challenges (in the form of high flows and inclement weather); however, both agencies were able to successfully navigate the challenges. In April, CDFW fully took over sampling with their staff and equipment. The survey was conducted five days a week with a crew of four employees. In June, CDFW coordinated again with USFWS to discuss sampling conditions and facilitate the switch to using their vessels and sampling equipment on July 1, 2024.

During the spring 2024, we captured 2,169 juvenile Chinook salmon between April through June. Using the Fisher's Length at Date table, 1,435 juvenile salmon were identified as fall run (Figure 1), 689 were identified as spring run and five were identified as winter run (Figure 2). CDFW collected 40 hatchery-origin juvenile salmon. Coded-wired tags were extracted; however, the results were not available at the time of the report release. CDFW also captured 18 *O. mykiss (*Figure 3). Of the 18*,* 14 were wild (adipose fin intact), three were wild with surgical sutures, and one was a hatchery-origin (missing adipose fin) smolt with surgical sutures. The *O. mykiss* with sutures are part of the steelhead life cycle monitoring program conducted by USFWS and NMFS. This capture data was shared with the respective researchers. Analysis is still currently in-progress at the time of this report's release.

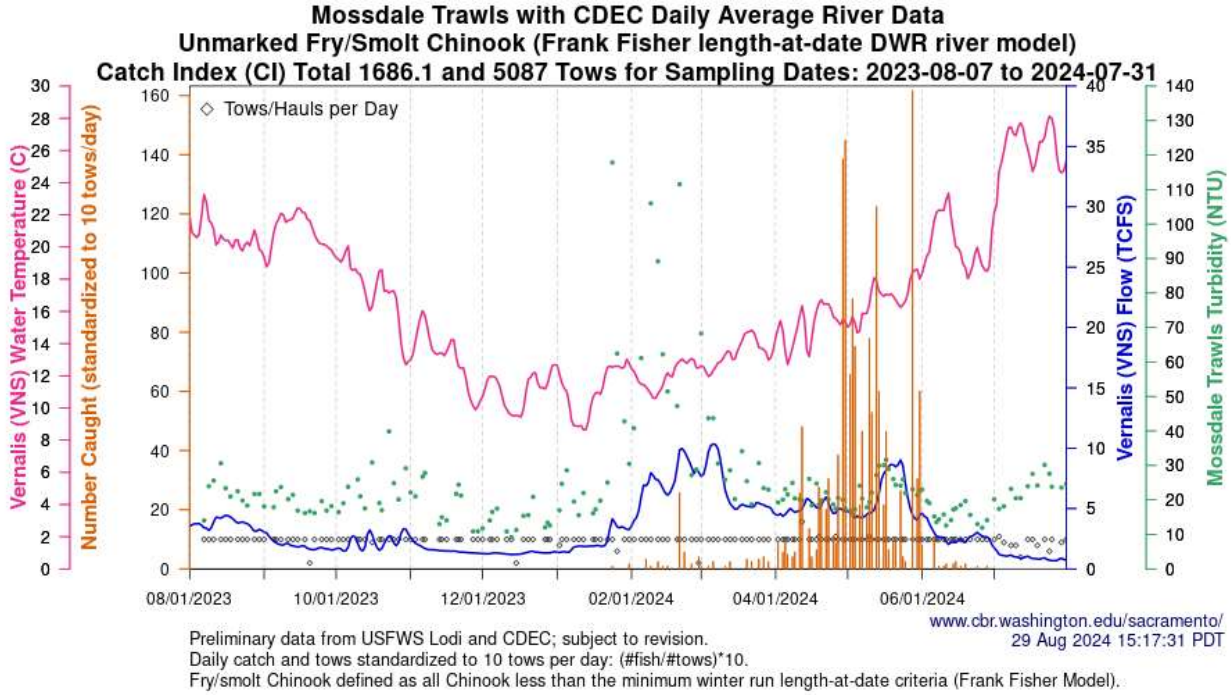


Figure 1: Fall run juvenile salmon caught at Mossdale Trawl during water year 2023

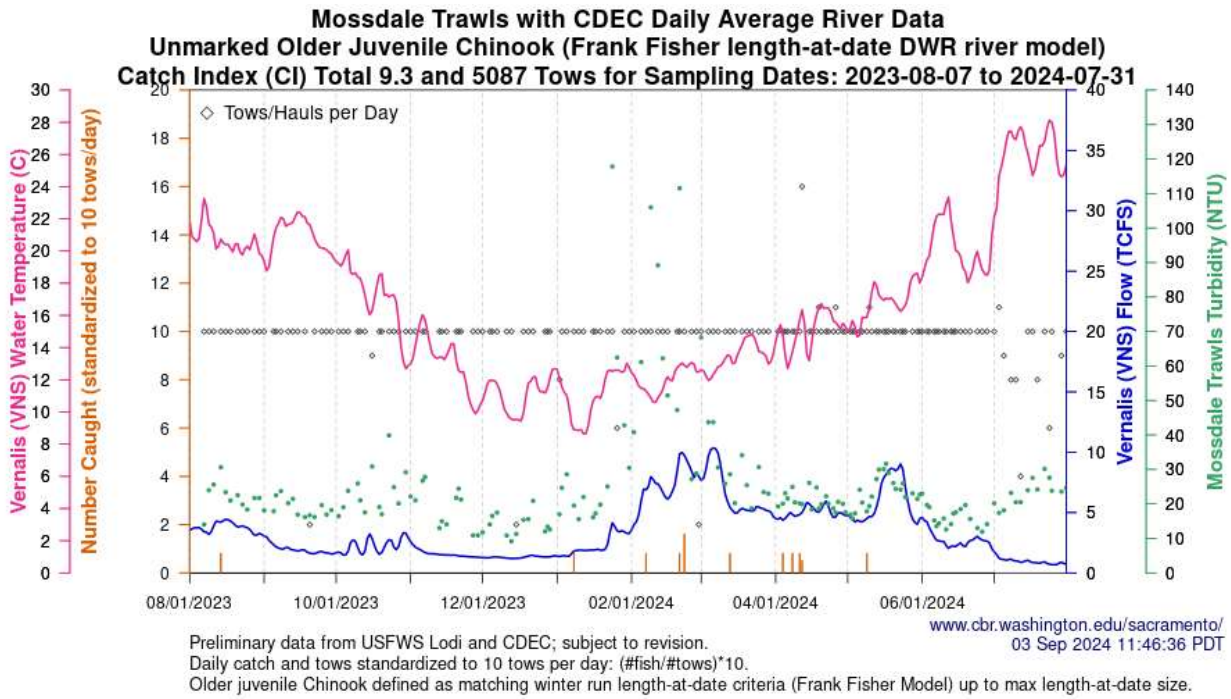


Figure 2: Spring run and Winter run juvenile salmon caught at Mossdale Trawl during water year 2023

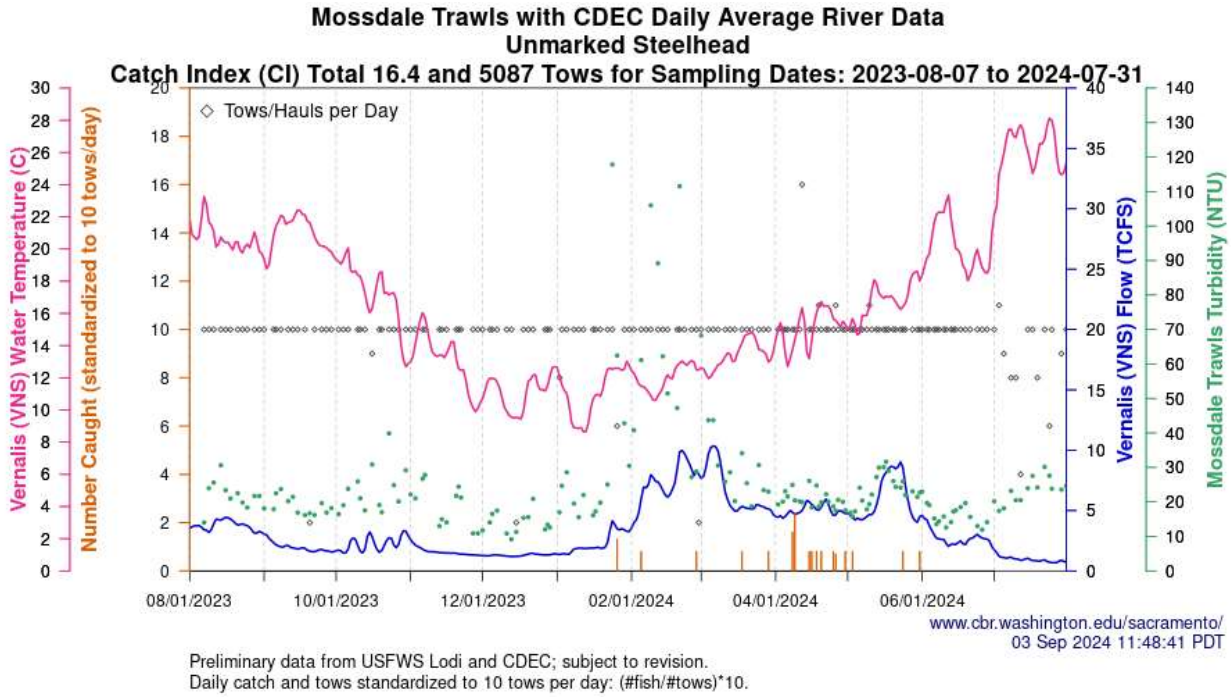


Figure 3: steelhead smolt caught at Mossdale Trawl during water year 2023

Discussion

CDFW's sampling effort was focused on capturing fall-run juvenile Chinook salmon's out-migration timing and size. Based on a preliminary review of the data, juvenile salmon capture increased significantly from 62 juveniles in 2022 to 2,169 in 2024. Table 1. shows historical raw salmon catch from 2007 to 2024.

Table 1: Raw juvenile salmon catch.

Year	Total CHN handled
2007	3392
2008	1696
2009	647
2010	296
2011	3265
2012	3236
2013	5388
2014	1343
2015	72
2016	202
2017	2752
2018	1547
2019	712
2020	*
2021	95*
2022	62
2023	249**
2024	2169

* indicates no sampling or sampling impacted by COVID 19 safety protocol.
** indicates sampling impacted by flood condition.

The biggest challenge when conducting the Mossdale Trawl was staffing. We had trouble hiring seasonal staff since 2020. The staffing shortage was resolved (temporarily) by having permanent staff work overtime. Lack of temporary staff creates a domino effect in which permanent staff are delayed in meeting many of their other obligations. These obligations include data entry, data quality control checks, analysis, project coordination, and report writing. The staffing shortage has been further complicated by the larger economic downfall. A long-term solution is needed, but not yet developed.

We were able to achieve most of the deliverables for Task 2, Mossdale Spring Trawl. We provide more details for each deliverable below.

1. We had compared our trawl protocol with USFWS's and align our sampling differences.
2. During April, May and June the Mossdale Trawl daily catch data are posted onto CalFish website weekly. These data is processed by University of Washington Columbia Basin Research staff before posting onto SacPAS: Cenral Valley Prediction & Assessment of Salmon website. [https://www.cbr.washington.edu/sacramento/]
3. Figure 1 to 3 shown above have provided Fall/Spring/Winter run juvenile passage and steelhead smolt passage at Mossdale Trawl for water year 2023. Current funding and staffing were originally designed to carry out the new enhanced Mossdale Trawl which is co-operating with USFWS year-round. After the contract execution, CDFW had concluded that the existing funding and staffing level was enough to continue the enhanced survey (which focused on fall-run population estimates and year-round fishery monitoring with reduced monitoring effort). However, to produce the spring-run and steelhead population estimate, more resources including both funding and staff are required.
4. All Mossdale monitoring data were transferred to USFWS weekly during April, May and June. USFWS retains all datasheets outside of these three months. All Mossdale surveying data are posted on to the EDI Data Portal. [Data Portal - Data Package Summary | Environmental Data Initiative (EDI) (edirepository.org)].
5. We had collected up to 200 samples of genetic material from juvenile salmon. All fin clip samples are dried and cataloged.
6. No special request or special study were made by GOTR in water year 2023.

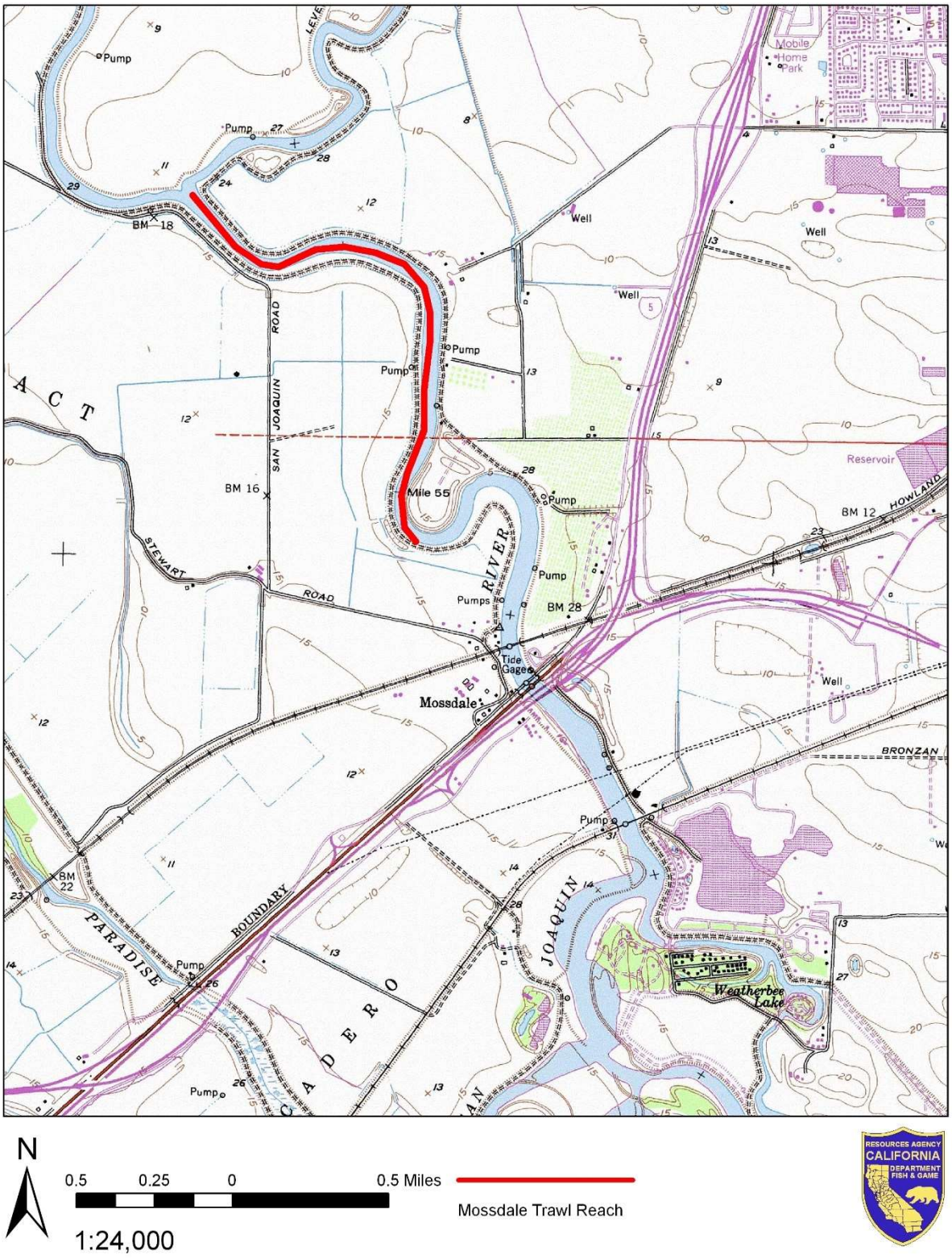
Conclusion

The Mossdale Trawl is a long-term monitoring effort on Delta juvenile fish with partial emphasis on the San Joaquin River basin salmonid migration size and timing. CDFW was able to perform the planned field sampling effort with staff working overtime, despite the staffing shortage. CDFW will continue to work internally to seek resolution on the staffing issue.

References

- Figure 1: [https://www.cbr.washington.edu/sacramento/tmp/juvmonitor_1725389190_144_SJ054_R.png]
- Figure 2: [https://www.cbr.washington.edu/sacramento/tmp/juvmonitor_1725488111_55_SJ054_R.png]
- Figure 3: [https://www.cbr.washington.edu/sacramento/tmp/juvmonitor_1725389315_763_SJ054_R.png]
- IEP 2024 Delta Juvenile Fish Monitoring Program, [https://iep.ca.gov/Science-Synthesis-Service/Monitoring-Programs/Delta-Juvenile-Fish]
- Kok, Ryan and S. Tsao, Mossdale Trawl Standard Operating Procedures. 2020.

Appendices



Mossdale Trawl Reach