

A Comparison of Methods Used in Mossdale Trawl Efficiency Tests

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Introduction

- The California Department of Fish and Wildlife (CDFW) has been monitoring the fall-run Chinook salmon smolt out-migrant population in the San Joaquin River (SJR) from April-June since 1988. The USFWS conducts the trawl the other nine months of the year.
 - Efficiency studies began one year later in 1989.
- Monitoring is conducted two river miles downstream of the Mossdale Landing County Park to just upstream of the Old River confluence.



Results & Analysis

- Data was compiled from all years with valid efficiency releases, 1989-2019 This Included:
 - > Total number of Chinook marked and released
 - > Total number and percentage of marked Chinook recaptured
 - Release strategy that was used
 - >Average daily flow at Vernalis (VNS)





Ecological Program

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- The data collected is used to determine:
 - > The annual smolt production in the SJR basin
 - smolt production trends
 - the timing and magnitude of smolt outmigration into the Delta

Methods

Survey Overview

- Sampling is conducted during daylight hours, usually 5 days/week from April-June each year.
 - This coincides with the peak smolt outmigration period.
- A Kodiak trawl net with an attached live box is towed upstream between two boats at 20-minute intervals.
- At least 10 tows per day are conducted, with additional tows for efficiency studies.
- Between tows, the live box is emptied of all fish and debris.
- During the following tow the fish are identified to species and measured.
 - Salmonids are keyed out to life stage and





Figure 1: Recapture rates for valid releases and average daily flow

 Data from each release type was combined and an average recapture rate across all water year types and flows was determined (Figure 2).
 > Due to the small sample sizes of the "Other" release methods, only the two most frequently used methods were investigated further.



Figure 2: Average recapture rates by release method

• Comparisons were made for both methods during years where the conditions such

separated by run or marks.



as water year type and average flows were similar across all releases (Figure 3).

- 2002-2004 for the release from truck method
- 2012-2013, and 2016 for the 120-minute stepped release.

Year	WY Type	Flow (CFS)	Release Method	Valid Releases	CHN Released	CHN Recaptured	% Recaptured
2002	Dry	3,335	Release from truck	2	3,954	35	0.89
2003	Below Normal	3,257	Release from truck	3	8,974	322	3.59
2004	Dry	2,665	Release from truck	5	15,877	505	3.18
2012	Dry	3,330	120 minute release	2	6,988	722	10.33
2013	Critical	3,093	120 minute release	3	15,459	930	6.02
2016	Dry	2,650	120 minute release	2	9,998	449	4.49

Efficiency Releases

- Release frequency is determined based on Merced River Hatchery production.
- All efficiency release Chinook are dye marked on one of their fins.
 - Dye color and location can alternate throughout the season to ensure that groups did not holdover into the next week following release.
 - Each release group has a subsample of fish checked prior to release to verify mark retention.
 - Releases take place at the Mossdale park boat ramp however release methods have varied over time (Figure 1).
 - 1989-2005 (Orange), fish were released in one group straight from the transport truck into the river.
 - > 2006-2011 (Green) methods varied, ranging from 15 to 90 minutes for release.
 - 2012-present (Blue), releases are made every 15 minutes over the course of two hours.





 Recapture rates and flows were plotted for each valid efficiency release by the method that was used (Figure 4).

 The natural logarithm for each release method was taken in order to determine the effects of flow on smolt vulnerability.

Conclusions & Next Steps

- Releases begin once the trawl crew is in place and the first tow is underway.
 Each Chinook that is captured is checked for a dye mark and ones with marks are recorded as an efficiency fish.
- Sampling continues until less than two efficiency fish are captured in a tow.
 This usually results in more than 10 tows being conducted for the day.
- Certain criteria must be met in order to have a valid release that can be used for generating the vulnerability estimate.
- Less than two efficiency fish captured during the last tow
- > The peak of efficiency fish captured is before the last tow
- > No efficiency fish are captured after the release date



- Both release methods were negatively influenced by flow. However, the 120-minute stepped release showed an overall higher recapture rate across all flows.
- No survey was conducted in 2020; the current plan for 2021 is to continue using the 120-minute stepped release method.
- Potential to conduct additional studies into release methods, such as release location.
 From shore (boat ramp) vs. middle of channel
 - Evaluate recapture rates and travel times (time between first release and first recapture in the trawl net) for each release location.

Acknowledgements

Thanks to Gretchen Murphey for locating and compiling the older release data; and to all the Merced River Hatchery staff and Mossdale trawl field crews over the years who made these studies possible.

- References:
 - Vernalis flow data acquired from California Data Exchange Center (CDEC), Vernalis (VNS station)
- 2018 Mossdale Spring Trawl. G. Murphey, S. Tsao. CDFW unpublished report
- All photographs were taken by CDFW La Grange office staff

