San Joaquin River Spring-run Chinook Technical Memorandum Group Meeting
Mass Marking
Thursday, August 28, 2014
10:00 am – 11:30 pm

Meeting Summary

Participants:

Ryan Kurth, DWR
Josh Israel, BOR
Becky Victorine, BOR
Zach Jackson, USFWS
Jimmy Faukner, USFWS
Elif Fehm-Sullivan, NMFS
Jonathan Schram, NMFS
Sheila Green, Westland's Water District
Pat Ferguson, CDFW
Erin Strange, NMFS
Philip Columbano, NMFS

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1. **Review of Meeting notes from July 24th:**

Last month's notes on the use of Genetics (July 27th), and the previous month's notes on the use of JPE's (June 26th), have been completed and sent out to the group. Erin is currently in the process of getting all of these documents posted to the NMFS website. The website will not only include the notes from the technical workshops we've been having, but it will also have any related background documents (the tech memo itself included). These documents and notes will be on the same page as the 10j rule (and all the documents associated with the 10j rule), and the 10a(1)(A) permit with the FWS related to the reintroduction activities. Erin will send the link out to everyone once this is completed. Are there any outstanding questions from anyone regarding the previous tech memo meetings? (None).

2. **Presentation: Juvenile fall-run Chinook salmon calcein marking pilot study on the San Joaquin River (Jimmy Faukner, USFWS. Preamble by Zach Jackson):**

Introduction (Zach): USFWS initially became interested in using calcein on reintroduced San Joaquin salmon because of its potential regarding down-river monitoring projects, such as the Mossdale Trawl, Chipps Island, etc., because these fish would not have to be sacrificed to identify them. Calcein might also be effective at identifying San Joaquin

reintroduced spring-run at the Delta Pumping Facilities. USFW wanted to find out how long calcein markers lasted on each fish at a level that can be identified, along with which sizes of fish were best for the calcein marking process. Unfortunately, due to warm water temperatures last year, the study had to be wrapped up early, so technically we don't know definitively how long calcein markers would last on fish under the studies conditions, but overall, the study was very helpful in teaching everyone about the use of calcein on Chinook salmon reintroduced into the San Joaquin River. It's hoped that similar project studies will be continued on an annual basis starting next year.

Presentation (Jimmy): Currently, all Chinook salmon that are part of the SJRRP reintroduction effort are coded wire tagged, and have their adipose fins clipped. One advantage to the addition of calcein marking to these fish would be that fish could be identified without having to be sacrificed, such as would be the case in removing a coded wire tag. Another interest in the use of calcein is that marked fish could be fairly easily identified at the pumping facilities. Most of the personnel at these facilities have already been trained in the identification of calcein marked fish from previously conducted Delta smelt studies.

Initially looking at the literature, it would seem that calcein markings on fish could be identifiable for a relatively long period of time (6 months to 1 year). It was also found however, that exposure to sunlight can significantly reduce the marker retention size. The good news is that there are no minimum size limits for fish that can be marked (juveniles to adults), and calcein would be a unique marker for salmon for the purposes of the SJRRP since no other salmon are currently being marked this way within the system. Calcien is also not shown to increase predation in fish, unlike other markers such as Bismark Brown.

Scoring fish marked with calcein is a pretty straight forward process; however it should be noted that fish that are collected, and then frozen, then identified later can also lead to a shorter retention time of calcein markers when compared to fish that are identified on the spot. Detectors that are used to see calcein marks on a fish can be used in a dark room, or in the field like at a rotary screw trap (okay if there is some natural light present). Interestingly enough, if a calcein detector isn't available for identifying fish marked with calcein, then viewing fish through a transparent piece of yellow plastic would also suffice. One limiting factor also noticed during the study is the battery life of the detector itself. Calcein detectors apparently don't work as well on a low battery, and calcein marked fish that would otherwise be identified if the battery was full could be overlooked.

When initially marking fish with calcein, it's recommended that fish be immersed in a calcein solution of 5g/l for 3-7 minutes. Putting fish in a salt solution also helps reduce fish stress during handling and transportation, but it also helps in the uptake of calcein by the fish's tissues. For identification purposes, especially when compared to coded wire tags or acoustic tags, using calcein to mark the large numbers of fish necessary for the reintroduction effort might prove to be the most cost effective.

As far as mark retention, fish in one experimental holding cage retained the marker for the full extent of the experiment (71 days), while fish in the second experimental cage retained their calcein markers for only about 35 days. The difference between these could have been attributed to the initial size of the fish when they were marked, as the fish in the cage that experienced longer retention of calcein were 20 mm. longer than those fish marked in the cage that experienced shorter calcein retention time (larger fish retain calcein better than smaller fish). It's also important to note that because the experiment was cancelled prematurely on account of warm water temperatures, it's not entirely unlikely that calcein markers can remain visible on fish past 71 days. One issue here to think about is would 35 – 71 days give calcein fish enough time to reach the pumping facilities to be identified? 35 days might be cutting it a little close, although between 35 and 71 days shouldn't be a problem since fish apparently can move through the system fairly quickly.

Looking back at the calcein retention issue, it might be worth studying the various reaches of the reintroduction area with regard to how much natural light reintroduced fish would be exposed to as they travelled down river. Turbid conditions in the lower reaches for example might be beneficial in calcein retention, as opposed to in the upper reaches were water is clearer and fish are exposed to more natural light. Furthermore, releasing acoustic tagged fish in the Restoration Area to see where fish like to spend most of their time as they travel downriver might also be beneficial, as this would give us an idea as to what spans of time reintroduced fish would be present in shaded areas versus naturally lit areas.

3. Discussion:

A big advantage to using calcein in the case of the SJRRP reintroduction effort is that we could mark a large number of fish all at once that wouldn't have to be killed to be identified once they've reached the Delta Pumping facilities.

A potential disadvantage to using calcein is that accuracy of detection at the delta facilities might vary depending on the factors discussed earlier, and further study is needed to address this.

Calcein marking fish produced at the hatchery over the first 1-3 years of the introduction effort, even though these fish are already adipose fin clipped and coded wire tagged, could be a way to identify the fish before having to kill them and give us more information on retention time to the Delta facilities. Using calcein markers on naturally produced spring-run originating from the first generations of reintroduced hatchery fish also isn't entirely unrealistic; however locations within the Reintroduction area where these fish would be caught and tagged would have to be identified first.

So is it feasible to capture all of the naturally reproduced San Joaquin spring-run (or at least a large percentage of them) and mark them using calcein so they can be identified should they become entrained at the Delta Pumping facilities? Answer: Could be possible during lower flow conditions if a good location to do this is identified. Further study is needed. We

might end up using calcein for other studies for now, but we certainly won't stop using adipose fin clips and coded wire tags for the fish we're already reintroducing to the San Joaquin.

Regarding any broader discussion for the use of mass marking in general, Philip C. drafted a document comparing the various types of mass marking and the pros and cons of each for reference. In Philip's opinion, using dyes for marking can be efficient and cost effective for large numbers of fish.

4. Action Items:

a) Jimmy will provide Erin with the actual report today's presentation was based on, so it can be referenced should further questions arise about the specific details of the study discussed.

b) Erin will send the link for the NMFS website out to everyone where the notes and background documents to our tech meetings can be found once everything has been uploaded.

c) Erin will send out copies of the 2014 tech memo to the group immediately following this meeting.

d) Erin will send out the updated Guidance document for discussion at the next meeting

e) Next tech memo meeting will take place on September 25th. We will discuss the 2015 Tech memo and the Guidance document.