

## Upper Sacramento Scheduling Team

Spring Management of Spawning Locations Subteam

Wednesday, July 7, 2021 | 1:00 – 2:30 p.m.

### MEETING SUMMARY

#### Participants

<b>Agency</b>	<b>Attendees</b>
CDFW	Crystal Rigby
DWR	Mike Ford
Kearns & West	Alyson Scurlock, Terra Alpaugh
NMFS	Eric Danner, Rachel Johnson, Stephen Maurano, Steve Lindley
Reclamation	Elissa Buttermore
SWRCB	Michael Macon
USFWS	Kevin Niemela

#### Action Items

- **Elissa and Stephen** to work on clarifying the scope of what can be included in the Spring Management of Spawning Locations Study Plan (in terms of topics, experimental/research methodologies, and funding intensity).
- **Elissa** to clarify Reclamation's threshold and process for funding experimental portions of the study.
- **Stephen and Rachel** to brief NMFS upper management on the path forward for the subteam and the funding constraint question.
- **All** to begin list of existing tools or those that would be easy to develop based on existing data; start identifying the shortcomings of those existing tools and what kind of studies/experiments would address the shortcomings/reduce uncertainty; bring lists for discussion at the next subteam meeting in August.
- **Elissa** to begin coordinating with other subteam members to help draft sections of the study plan.

#### Key Discussion Topics with Summary of Perspectives, Outcomes, and Agreements

##### *Meeting Objectives*

1. Confirm mutual understanding of the Spring Management of Spawning Locations for Sacramento River Winter-run Chinook Salmon Charter
2. Solicit drafting volunteers and confirm schedule
3. Begin brainstorming topics for inclusion in the study plan

##### *Introduction to the Spring Management of Spawning Locations Action and Charter*

Reclamation presented an introduction to the Spring Management of Spawning Locations Action and Charter. Key takeaways included:

- Research indicates that peak spawn timing of Sacramento winter-run Chinook may be influenced by water temperature management.
  - The Jennings/Hendrix paper suggests that high water temperatures correspond to increased and delayed peak spawning in July and August and hypothesizes that cooler springtime water temperatures result in earlier peak spawning.
- There are two strategies to mitigate winter-run egg mortality during drought years:
  - (1) Release cold water early to drive the peak of winter-run spawning earlier to achieve emergence from the gravel before temperatures increase.
  - (2) Hold cold water until later in the season when the bulk of spawners begin to deposit eggs.
- Project objectives include Reclamation coordinating with NMFS and other stakeholders through SRTTG, SRSP, and USST to establish research to refine the state of the science.
- Project next steps include identifying technical team membership, developing a Study Plan, and updating information in seasonal and annual reports.

### ***Spring Management of Spawning Locations Study Plan***

The subteam discussed the goals, process and timeline, and topics for inclusion in the Spring Management of Spawning Locations Study Plan.

Perspectives and questions shared by subteam members included:

- **Current Research and Ideas/Considerations for Study Plan**
  - Reclamation – Interested in integrating more tools into the existing SacPAS fish model, which is a publicly available tool used to estimate TDM. Having a more holistic look at how water temperatures affect all life stages would be helpful for informing operations. Additional modeling could also be completed to update the model in the Jennings/Hendrix paper that is referenced in the Charter and the NMFS BiOP.
  - NMFS – Peter Dudley (SWFSC) is working on a paper on spawning habitat and the spawning selection function that could potentially be adapted to predict where and when winter-run Chinook would spawn. There is potential for modeling efforts to use historic data and predict future spawning locations in space and time. Want to hear more about ideas for experiments.
    - Reclamation – First step is focused more on modeling than trying to implement an action.
  - NMFS – One challenge is that water temperature limitations only exist in some years. In years where water temperatures are not limiting, temperature requirements are met throughout the current distribution of redds and spawn timing is not relevant because all eggs will survive in terms of water temperature. This study focuses on years where water temperatures are limiting, and therefore cold water pool resources are limited. The decision point focuses on if cold water should be allocated in the springtime to protect fish from spawning too late and run out of cold water at the end of the year when water temperatures are limiting. This shifts the distribution forward in time and protects more eggs. For any given year, if the

temperature management window begins to shrink, the distribution of redds in time and space becomes more important for the overall TDM estimate for that year.

- NMFS – The idea of this action was not fully formed; the title is Spring Management of Spawning Locations, and spawn timing is also being directly referenced. This group should be able to proceed with both. Peter Dudley’s work focuses more on spawning locations and the Jennings/Hendrix paper focuses more on spawn timing. Spawning locations and spawn timing are linked because you want to minimize TDM through both. Suggestion to clarify the scope of what can be included in the Spring Management of Spawning Locations Study Plan.
  - NMFS – An important point is that spawning locations and timing are intrinsically linked. The number of fish coming in would play an important role for spawn timing, spawning locations, and the amount of superimposition. The more we can try to address with this work the better.
  - NMFS – Curious about what extent the rate of change of temperatures and responses to egg-to-fry survival have been analyzed. The Jennings/Hendrix paper looks at the larger phenology around temperatures, spawn timing, and emergence. Hoping this subteam can look at the manipulation and rate of change of temperatures and fish responses. Also interested in trying to understand the consequences of rapid changes, such as adjusting water temperatures, and the decoupling of fish physiology and responses. The reason spawning is a function of temperature is because physiology is built off of that.
  - NMFS – The two pieces that need to be simultaneously addressed are: (1) making good progress on the physical modeling and (2) examining the consequences, cues, and drivers that adult fish experience with rapid water temperature changes. The study could benefit from having a dedicated phenologist to examine these issues. Building in tradeoffs between winter-run and fall-run Chinook would be another important consideration.
- **Funding for Experiments**
  - NMFS – Are there funding opportunities for the experimental portion of the study, such as applying a dedicated phenologist?
    - Reclamation – Reclamation cannot commit to funding extra efforts that are beyond the Proposed Action at this time. Funding needs can possibly be included in seasonal reports in an improvement section if they do not fit into the Study Plan.
    - NMFS – The Charter indicates that Reclamation will establish experiments. It would be good to know in advance if resources will not be applied so time is not spent putting forward proposals.
    - Reclamation – Additional resources could potentially be pursued but certain information will not be able to be included in the Study Plan.
    - NMFS – Reaching out to outside parties to assist with foundational phenology work would require additional resources. If additional resources will not be applied, there may be modeling that fits into existing resources and teams. Some USFWS disease and pathology work could be related.

- Reclamation will clarify the threshold and process for funding experimental portions of the study.
- **Existing Tools**
  - NMFS – We have developed predictive tools related to the Life Cycle Model (LCM) and temperature models. Is there something inadequate about the state of the science? If so, funding would be needed to make improvements.
    - Reclamation – We could use existing models to predict spawning distribution and see how accurate that is. This year’s data could be useful for updating the existing models.
  - NMFS – The Jennings/Hendrix paper is observational; we do not understand the mechanism behind the correlation. One potential advancement is to manipulate temperature cues, endpoints, etc. in a lab or hatchery setting. We also do not know the limits of increasing water temperatures and pre-spawn mortality. We have fundamental tools that might not be a heavy lift, such as adding the egg timing component to SacPAS and the LCM and other tools the SWFSC could implement.
  - NMFS – Dealing with adult salmon is very different, especially winter-run Chinook adults. The SWFSC is initiating work on fall-run Chinook that could produce useful information for this study; the plan is to tag adults captured in the ocean or bay to try to monitor upstream migration. This study would likely benefit most from data from actual tagged winter-run Chinook adults, but that may not be realistic due to the difficulty of getting permits for an endangered species.
    - NMFS – Suggestion for better understanding the adult’s temperature tolerance in a hatchery setting since it is potentially cheaper and has less permit difficulties. Could see what USFWS thinks about the idea to help inform the process.
  - Kearns & West – Does the subteam want to focus on the gaps/inadequacies of existing tools and how to leverage current efforts with them or focus on larger experimental study questions that would require ongoing conversations about funding sources?
    - NMFS – This team should have the capacity to do both; this would not be a fruitful effort without guidance from leadership and funding. Could come up with ways for adaptive management that have different scales for cost and knowledge gained. If the intent is to not provide funding resources, it may be hard to motivate this team to put a lot of brain power behind this study. This group may not be in a position to answer large questions in the scope of this study.
    - NMFS – A suggested first step is to create a list of existing tools or tools that would be easy to develop based on existing data. Then could start identifying the shortcomings of those existing tools and what kind of study would likely address the shortcomings and reduce uncertainty. Could be the basis of discussion for the next meeting.
- NMFS – It would be helpful to have guidance from leadership from Reclamation and NMFS regional offices on the path forward for the subteam and funding constraints.
  - NMFS staff will brief upper management on a recommended path forward.

### ***Next Steps***

- Reclamation and NMFS will work on clarifying the scope of what can be included in the Spring Management of Spawning Location Study Plan and Reclamation's threshold and process for funding experimental portion of the study.
- Subteam members will begin creating a list of existing tools or those that would be easy to develop based on existing data and start identifying the shortcomings of those existing tools and what kind of studies/experiments would address the shortcomings/reduce uncertainty.

***Next Meeting:*** Friday, August 20, 11:30 a.m.-1:00 p.m.