

Floodplains Reimagined Salmon Benefits Ad hoc Group Meeting

May 19, 2022, 1 pm – 3 pm

Virtual Meeting, Zoom platform

Meeting Objectives:

- Shared understanding of both the Salmon Benefit Model (SBM) and the habitat suitability approach.
- Link the SBM and the Habitat Quantification Tool (HQT) to better identify information gaps.
- Identify sources of data or other input datasets.

Action Items

- Rene Henery (Henery), Trout Unlimited/University of Nevada, Reno - Offered to share data set demonstrating impacts of draining on downstream fish growth.
- Kearns & West (K&W) – Distribute slides and meeting content via SharePoint for further comment and feedback.

Welcome and Introductions

Kayla Kelly-Slatten (Kelly-Slatten), Senior Associate at Kearns & West, welcomed all attendees, reviewed the meeting agenda, and objectives.

Salmon Benefit Model

Steve Zeug (Zeug), Cramer Fish Sciences presented on the assumptions, limitations, and inputs/outputs of the SBM.

Group members provided the following comments/questions:

- Lewis Bair (Bair), RD 108 – Observation that in theory inundating land would benefit juveniles by 1) providing additional habitat and 2) water released from inundated land would carry nutrients back into the system for fish in stream. However, the SBM does not account for instream food supplementation from drained land.
 - Response: Zeug, Cramer Fish Sciences – Observation that the data collected for the pilot effort cannot draw a connection between draining land and instream food supplementation. As the project continues there will be additional variables tracked which may offer nascent approaches to building instream food supplementation metrics.
 - Response: Henery, Trout Unlimited/University of Nevada, Reno – Clarification that it is theoretically possible to model food availability based on prey saturated floodplains, and the fish food project with Jacob Katz and Jacob Montgomery has potentially valuable data to support research on this topic.
 - Response: Bair, RD 108 – Recommendation to track food supplementation from floodplain inundation as a metric due to its importance as part of the project's multi-benefit approach.
 - Response: Zeug, Cramer Fish Sciences – Observation that currently available data does not demonstrate connections between inundation and food supplementation.

- The correlation must be established before resources are spent on modeling the benefit.
- Response: Henery, Trout Unlimited/University of Nevada, Reno – Clarification that a data set demonstrating the correlation between inundation and food supplementation does exist.
 - Bjarni Serup, CDFW – Clarification that while it is important to document the benefits and tradeoffs of the project fish food supplementation is only one of many benefits and modeling other elements may be of greater importance.
 - Response: Kelly-Slatten, K&W – Observation that the project is operating on a limited timeline and conservation of resources is a necessary consideration.
 - Kelly-Slatten, K&W – Observation that additional information is needed to fill gaps in the SBM.
 - Response: Jacob Katz (Katz), Cal Trout – Recommendation that recent research on the benefits of off channel habitat access ([Advancing Diet Reconstruction In Fish Eye Lenses](#)) be leveraged to benefit ongoing modeling efforts.
 - Alison Whipple, SFEI – Observation that the Habitat Suitability Evaluation is considering a simplified productivity metric which could offer insight into inundation food supplementation albeit with some caveats.

Salmon Rearing Habitat Suitability Approach

Chris Campbell (Campbell), cbec, presented an overview of the current work with the Salmon Rearing Habitat Approach.

Campbell guided an open discussion with the Salmon Model Ad Hoc group by posing the following questions:

- Campbell, cbec - How can connectivity be assessed for fish across multiple habitat types from the river to the flood basins and flood basins to field units?
 - Response: Serup, CDFW – Clarification that entrainment rates will likely be constant across scenarios given the little information available on the topic in the Sutter Bypass beyond the indication that flow is currently the strongest predictor for entrainment. Acknowledging that the true relationship is likely not linear a one-to-one ratio may work.
 - Response: Keith Marine (Marine), Aquatic Resources Consulting Scientists – Recommendation to conduct sensitivity analysis on simple/rational diversion rate assumptions to assure that salmon populations are benefiting as expected and to better target areas for focused evaluation for future project needs.
 - Henery, Trout Unlimited/University of Nevada, Reno - How does the model deal with the number of fish that are available to be diverted at a given moment? Hypothetically, how the fish move in the river system imparts greater influence over the diversion rate than other nuances in the diversion rate.
 - Response: Zeug, Cramer Fish Sciences – Clarification that the SBM uses a distribution based on capture in fish traps. So, it is not a one-to-one relationship, but rather a curve representing the number of fish.
 - Response: Henery, Trout Unlimited/University of Nevada, Reno – Clarification that variability in the curve representing the number of fish available for diversion in a given moment would overshadow the variability in the water-to-fish rate of diversion. The density dependence outweighs the flow dependence.

- Response: Keith Marine, Aquatic Resources Consulting Scientists – Clarification that the timestep of the hydrologic model will be an important factor in integrating that density dependence. If a sensitivity analysis were executed it must take into consideration the seasonal density dependence or assume flood pulse events and superimpose that on the model timestep.
- Response: Serup, CDFW - This issue was addressed previously with a one-to-one ratio where a given percent of diverted flows correlated to a proportionate amount of fish being diverted. Each weir may divert fish at different rates, so sensitivity should compare scenarios with the same flow rates and entrainment sites.
- Katz, Cal Trout – Observation of current research ([Advancing Diet Reconstruction In Fish Eye Lenses](#)) which used stable isotope analysis in 2016 to 2017 showed that 82% and 86% of each year's wild winter run salmon contained floodplain rearing signals in the archival tissues. Given the hydrologic conditions during outmigration there was only two to three weeks when the fish could have gained access to floodplains through any weirs. This is antithetical to the flow and density-based argument and suggests other mechanisms are at work in migration.
- Response: Henery, Trout Unlimited/University of Nevada, Reno Clarification that an alternate interpretation of the same study/data is fish move more freely when there is insufficient flow for river pulses to drive movement. Screw trap data shows that when flow changes occur a lot of larger fish tend to move, but flow is certainly not the only factor for fish movement.
- Kelly-Slatten, K&W – Clarification that the conversation must remain actionable for the Technical Team.
- Response: Technical Team – Recommendation to use the approach described by Henery with an emphasis on quantification and evaluation in a structural uncertainty framework.
- Campbell, cbec – Should suitability data for the analysis approach be binary or should it be on a curve?
 - Response: Henery, Trout Unlimited/University of Nevada, Reno – Clarification that the HQT used an approach to define data as binary for what is and is not suitable and within that binary there is a range. To create a range of suitability a Weighted Useable Area might be useful, but it's maybe prone to mischaracterizing habitat.
 - Response: Marine, Aquatic Resources Consulting Scientists – Recommendation to be careful in when taking data from other regions and transposing it here. More direct data needs to be collected and outside data must be considered with greater scrutiny.
 - Response: Serup, CDFW – Observation that the region is not habitat limited, and the larger driver is assuring adequate water is present to support habitat connectivity, inundation, and navigation.
 - Response: Katz, Cal Trout – Clarification that fish do well when the bypass is flooded but creating flooded habitat on demand is out of the question. Is the management directive then focused on getting the most out of flooded benefits? In other words: How do you get the most impact from the water available under normal and dry conditions?
 - Response: Serup, CDFW - The question is not how do we optimize benefits with the water available, but is it possible to optimize fish habitat by controlling flows? To achieve this there is a need for finer scale data.

FLOODPLAINS REIMAGINED

Adjourn

Kelly-Slatten thanked attendees for their attendance and participation and adjourned the meeting.

Meeting Attendees

The following people were in attendance:

Name	Agency
Keith Marine	Aquatic Resources Consulting Scientists
Andy Duffey	Butte Slough Irrigation District
Jacob Katz	Cal Trout
Paul Buttner	CA Rice Commission
Bjarni Serup	cbec
Chris Campbell	cbec
Jenna Duffin	cbec
John Stofleth	cbec
Joshua Bush	CDFW
Scott Wright	CDFW
Steve Zeug	Cramer Fish Sciences
Jesus Esparza	DWR
Lorie Price	DWR
Eric Holmes	Kearns & West
Kayla Kelly-Slatten	Kearns & West
Todd Manley	NCWA
Ally Bosworth	NMFS
Kristy Dybala	Point Blue
Lewis Bair	RD 108
Alison Whipple	SFEI
Bronwen Stanford	SFEI
David Peterson	SFEI
Rene Henery	Trout Unlimited/University of Nevada, Reno
Rod Whittler	USBR
Mike Urkov	USBR Consultant
Barker Holden III	USFWS
Kaylee Allen	USFWS
Laverne Bill	Yocha Dehe Wintun Nation