

OUTCOMES MEMORANDUM

TO: CAMT Members
FROM: Bruce DiGennaro
DATE: November 24, 2020
RE: November 17, 2020 CAMT Meeting #97

Attendees: Alison Collins, Ann-Marie Osterback, Ben Geske, Brad Cavallo, Brett Harvey, Brycen Swart, Carl Wilcox, Cathy Marcinkevage, Chuck Hanson, Corey Phillis, Dana Lee, Deanna Sereno, Denise Reed, Diane Riddle, Eric Danner, Erik Loboschefsky, Erin Cole, Eva Bush, Heidi Williams, Jana Affonso, Jason Hassrick, John Ferguson, Josh Israel, Kate Spear, Larry Brown, Lenny Grimaldo, Lynda Smith, Mario Manzo, Melinda Baerwald, Noble Hendrix, Rachel Johnson, Rod Wittler, Sally Rudd, Sam Luoma, Scott Petersen, Sheila Greene, Shelby Rinehart, Stephen Maurano, Steve Culberson, Steve Lindley, Ted Sommer

Action Items:

- Bruce – distribute DCG documents once they are finalized
- WRLCM stakeholder meeting – consider actions to incorporate and evaluate their implementability

Discussion Highlights:

1. Agenda and Updates
 - The Delta Coordination Group has been meeting monthly since June. Developing a monitoring and science plan using the PROACT approach for structured decision making.
 - Is there a way we can get ahold of these documents?
 - The decision support tool is ready, the other documents won't be ready until the end of this month at which point Bruce can help distribute.
 - Salmon Entrainment Modeling for 2021 and beyond
 - The new ITP calls for developing predictive modeling tools to try and help prevent entrainment events. There are two complimentary models in different states of development: ICF's model is expected to be ready this spring and DFW's model (being led by Jereme Gaeta) is still in the early stages of development. We expect to have the Salmon Management Team test both models.
 - The Salmon Subcommittee received presentations on both models. Feel free to reach out to your technical representatives for more info.
 - Will the entrainment model be run type specific?
 - The initial effort will focus on winter run but there is interest in expanding beyond that. Also, need to develop a similar model for Delta smelt.
 - Culture and Supplementation of Smelt (CASS)
 - There is a new interagency coordination team (led by DFW, USBR and DWR) focused on addressing the need for working with cultured Delta smelt.
 - There are three sub teams: captive propagation, research, and regulation coordination working group that collectively are focused on:
 - securing a refuge population
 - providing guidance on using fish for supplementation and research

- develop a supplementation strategy
- helping to inform other habitat actions like restoration
- conducting research to inform supplementation
- conducting outreach for cultured Delta smelt and supplementation planning
- CASS is not venturing into policy, regulatory decisions, or funding research/supplementation.
- Thus far, we have developed a charter and a cultured fish request and review process and we are working to identify critical knowledge gaps and coordinate annual work plans. Other Year 1 activities include:
 - developing a Hatchery and Genetic Management Plan which collates key genetic information
 - developing a state and federal process for permitting an eventual release
 - prioritizing research needs
- Is one of the project priorities related to the potential availability of smelt for tagging studies?
 - Yes, one of the general research interests is: if cultured fish are released in to the wild, how do we identify them?
 - There will be some ongoing studies queued up for some VIE taking and collaborators are interested in that.
 - The tagging issue and release of fish in the wild is a major issue that CASS will be addressing – there is not something that there is a great deal of clarity about right now because there are a great deal of issues around putting cultured fish in the wild.
- There is an open solicitation period between now and December 1 to request cultured fish for research studies. If interested, let Bruce or Ted know (it is also posted on the FCCL website).
- CSAMP Organizational Framework for Delta Smelt
 - As part of the structured decision making for Delta smelt, Compass is developing a strategic organizational framework with three main goals:
 - Clarify CSAMP's work around Delta smelt
 - Clarify the roles, contributions, and responsibilities of CSAMP members
 - Connect the SDM process with the Delta Smelt Science Plan and other regulatory processes
 - Work on the organizational framework is getting underway, starting with one-on-one calls with CAMT members in Nov/Dec. Will share results and discuss key issues and questions at the 12/15 CAMT meeting. Then develop a draft, solicit input and then seek approval from CAMT and Policy Group.
- 2. Winter Run Life Cycle Model (WRLCM) – How is it evolving to inform policy?
- Historical background and value of the WRLCM
 - The endangered status of Sacramento River Winter-Run salmon caused a jeopardy finding in 2009. After arguing in court, Judge Wanger concluded that a life cycle model was necessary going forward in order to understand how population changes over life transitions. By looking at specific transitions, it's possible to change model assumptions/parameter values and see effects on population metrics like escapement thereby informing where further targeted research and/or monitoring are needed (e.g., we've found that fry survival has a large impact on population dynamics).
 - We've been working to make the model (based on observed, downloadable data) more transparent and accessible. There is a ton of information/assumptions/covariates that you can play with to see what's driving the lifecycle models. The website is still under development but will also include documentation and presentations to stakeholders – additional feedback is welcome.
- Applications of the WRLCM
 - We're interested in using the life cycle model to support decision making by comparing the impacts of various

actions against a baseline (i.e., no action). For example, we're seeking to evaluate the survival benefits associated with restoration actions across various geographies (e.g., restoring fry rearing habitat in the upper and lower stems, Yolo Bypass and Delta).

- By modeling three different levels of survival benefit from restoration (null, 5% and 10%) we develop 12 combinations of geographies and benefits that can be run through the model. Since actual survival benefits are unknown, the optimal decision is to implement the action that does the best across all survival levels (in this case, restoring the lower river). Through experimentation we'll be able to fill in the actual benefits to develop a more refined strategy and avoid potential negative impacts from restoration (e.g., concentrating fry habitat in areas where smelt survival is not very good).
- Other analyses are focused on minimizing the impacts of critically dry and warm conditions. Seeking to understand what actions could be implemented to protect the central part of the spawning distribution in June and July (as opposed to the shoulders in May and September). Will also look at spawn timing of winter run and the relationship between reducing temperature in April and temperatures in September. Since the focus is mitigating these events, it makes sense to look at critical years.
- This approach avoids dynamics associated with running Cal Sim and goes straight to evaluating temperature management actions in dry years (e.g., modeling around Shasta reservoir tradeoffs in temperature).
- Questions/Comments
 - How will you study non-local survival effects (i.e., you do something upstream and it impacts survival in the Delta)? In SIT modeling we often see decreases in survival at the location of the restoration but increases elsewhere in the model. Is there a plan to include the ocean at some point?
 - This particular exercise focused on the benefits of restoration at the fry stage. But there are other hypotheses about the way that restoration can improve survival. We want to be able to evaluate each of these hypotheses individually or in combination with each other using size dependent survival rates. Timing is already being captured in the model, but we aren't yet capturing the fact that fish that grew to a larger size might have a differential survival rate relative to fish of a different size who reared in lower quality habitat.
- Current developments
 - EPTM v 2 to estimate Delta smelt smolt survival update:
 - Combines hydrodynamics and fish behavior to simulate delta smolt survival and routing.
 - Created for Water Fix BO in 2017, since then there have been significant efforts (e.g., stakeholder meetings) to make it more accurate.
 - Potential use as a decision support tool:
 - generate DSM2 runs to reflect a given hydrology (adjusting exports and flow)
 - distribute the simulated fish by space or time.
 - run the EPTM over the outmigration period.
 - track if/when/where smelt died to determine survival and entrainment rates
 - WRLCM update that incorporates fish size to evaluate habitat restoration
 - Hypothesis: habitat restoration can increase growth rates and bigger fish have a better chance of survival
 - Fish size isn't currently included in the WRLCM, but fish size will be included in a growth model as part of the WRLCM - S
 - Provides a way to evaluate what additional survival is needed by life stage, size and region – can help identify and prioritize where to focus restoration efforts
- Future Developments

- Interested in streamlining the process to create a decision support tool that can be used in real time.
- Improve Delta Fry model to better understand fry use of the Delta and impacts on fry from habitat restoration:
 - EPTM for Fry in the Delta
 - Predict distribution, survival and sizes of fry under different hydrology
 - Improve the smolt EPTM by seeding it with realistic fry distribution
- Serve as a growth model to evaluate population response
- Evaluate restoration design to maximize the number returning adults
- Questions/Comments
 - EPTM is still a work in progress, we don't yet have a model that allows us to compare management actions in the Delta.
 - Will the EPTM include all the regions of the Delta or only the one shown on map?
 - The goal is to use the same DSM2 grid structure for fry as for smolt – so the spatial domain should be similar for both models. Assuming you were asking about fry EPTM and entrainment as well - that is one of the more interesting places to see where fry get distributed around the pumps, so I think we'd want to see the results for that stage.
 - Are the results of the screening exercise written up somewhere? It would be interesting to see how restoration projects that are receiving/set to receive funding line up with your (preliminary) results. There is a lot of emphasis on managed ag land in the bypasses – could the tool help to better evaluate the potential benefits?
 - The work on the restoration questions is in collaboration with Brett and Cory, in the process of drafting a paper that looks at the results. Interested in understanding how this lines up with spending on restoration projects – tied to Brett's management brief regarding evaluation. Regarding residence time in the Bypass, we haven't evaluated that thus far – but we have flow triggers and density dependence mechanisms, so if we are seeing a delay due to rearing that is habitat related we can explore whether we can create "sticky" habitats based on habitat quality.
 - I was involved before in the EPTM review and wanted to clarify whether there was continued work on EPTM – can we see the status? What does streamlining modeling mean?
 - We talked a lot about being able to do hypothesis testing.
 - Regarding EPTM 2 timeline: study plan was distributed, trying to provide a framework for evaluation. Still in development, but narrowing in on a product next year. When it is complete there will be documentation and a peer reviewed manuscript.
 - As far as streamlining – we don't know how to do it yet, but the first step is to automate it. We haven't run DSM 2 in house, don't know what that will take.
- Are documents posted yet?
 - Not yet, we are working on it – that is the idea eventually.
- On the management questions and benefits – there are additional actions that are interesting and some are called for in the BiOp, how do we get those actions in there? For example, in severe water years the BiOp calls for fish going to the hatchery and then being returned.
 - Perhaps we could spend some time in a stakeholder meeting specifying different actions and evaluating how well they could be implemented. Regarding the hatchery action: we are tracking both hatchery and normal components.
- The website is going to be very helpful. Consider engaging with Salmon Subcommittee. Is there funding for developing the decision support tool?

- Will distribute the website, growth model study plan and EPTM study plan (which should be done by the end of the year). Delta Fry model and streamlining are currently unfunded.
- Restoration Needs Brief
 - We don't understand quantitative benefits to salmon from restoration
 - EVPI estimates the value of missing information in terms of increase in adult salmon (i.e., if restoration decisions were based on more complete data)
 - Modeled salmon responses to habitat restoration are simplistic or not modeled. Two primary models (Life Cycle + SIT) aimed at showing abundance, survival and growth.
 - Better data on juvenile responses will support more effective decisions. Juvenile responses are rarely evaluated (often not planned/budgeted as part of restoration projects, also it's difficult to catch juveniles and determine length of stay)
 - Experimenting (e.g., w/ EDNA and otoliths) to better understand length of stay
 - Recommendations
 - Prioritize experimental measurement of salmon responses
 - Require validation
 - Research at the appropriate scale (temporal, spatial, and sample number)
 - Capitalize on existing opportunities
 - Restoration as "targeted experiments"
 - Prioritize development of innovative tools and approaches
 - Regulatory flexibilities
 - Structured Decision Making (to identify uncertainties, prioritize and integrate back into decision making tools)
 - Questions/Comments
 - Monitoring and improving our knowledge base are critical, recommend including this as part of CSAMP salmon recovery effort
 - Seems like there's agreement that this is needed, not sure if it has found a home or if we've determined what exactly CSAMP can do
 - There are actions in ITP regarding exploring how salmon are using restored habitats. Don't feel like we have a good focus on what monitoring programs are currently providing and what still needs to be done. May need a smaller group to determine what we want to learn and why, and what is being asked of each agency. Maybe a one-day symposium?
 - Agree that we need to work on alignment, don't think a symposium will be enough considering we don't yet agree on what we're trying to achieve.
 - Consider synthesizing data that is available as an early step.
- 3. Salmon Recovery Initiative
 - CSSP findings and proposed next steps
 - ESSA has delivered their final report ("Coordinated Salmonid Science Plan Assessment"). It presents a thematic sampling of the data culled from the Q Method survey they administered:
 - Theme 1 - High Agreement that activities are Highly Beneficial
 - Migratory & rearing habitat connectivity
 - Floodplain habitat
 - Monitoring prey availability & growth rates for juveniles
 - Invasive species & aquatic weeds

- Theme 2 - High Agreement that activities are Highly Implementable
 - Migration tracking
 - Contaminants
 - Entrainment
- Theme 3 - Low Agreement that activities are Highly Beneficial
 - Monitoring/reducing predation
 - Juvenile habitat-use in the Delta
 - Water & flow/conveyance management activities
- The Salmon Subcommittee's key takeaways are as follows:
 - ESSA's Report should be viewed as an interim milestone
 - It does not provide a comprehensive analysis of survey results or a specific "plan" for moving forward.
 - It does point us to areas of high agreement that could help us move forward together.
 - ESSA used a novel approach
 - The Q Method provided us with a rich data set (nuanced responses from a broad group of participants)
 - Some discomfort, likely due to: a lack of familiarity with the approach, the large number of statements to sort, different interpretations of statements' meanings
 - Much of the data (e.g., activities with low benefit scores) was not addressed in the report itself
 - Further analysis and discussion is warranted (especially, as per CSAMP's mission, regarding water management-related activities)
 - The Subcommittee proposes leveraging Phase 1 data/findings to pursue two parallel tracks:
 - Flesh out activities where there is high agreement about high benefits and/or high implementability
 - Conduct additional analysis of Q survey data
- Questions/Comments
 - Would be interested in taking some of the key findings back to survey participants to better understand why they responded as they did.
 - CVPIA is conducting a comparison of Near-Term Strategies + SRSP Science Plan + CSSP + DWR obligations planning. Roughly 2/3rds done with comparison, finding a lot of overlaps which should help decision makers with funding.
- Framework and Structure for Evaluating Salmon Recovery Projects
 - Policy Group working group has developed guidance and proposed tasks
 - Task 1: Formulate a framework/structure for coordination (how things fit together, including roles and responsibilities). Work with existing groups, understand and help coordinate.
 - Task 2: Examine who's doing what (i.e. what's getting done, what's not and why).
 - Task 3: Evaluate the benefits and costs of actions.
 - Task 4: Identify priorities (high impact projects).
 - Coordination framework
 - Goal of Salmon Recovery Proposal: Coordinate a portfolio of actions that has high potential for population scale improvements in salmonid recovery.
 - CSAMP's roles:
 - Build bridges among existing activities that help link geographies and aspects of the life cycle into a unified network of actions

Facilitator Notes, Not Reviewed or Approved by Meeting Participants

- Not to command, change or control any entity's mission or priorities but to create incentives for cooperation
 - Identify gaps in existing activities that might be crucial to recovery.
 - Biological Goal – recovery of populations
 - Organizational Structure – work with existing products and groups
 - Ongoing Activities and Existing Priorities
 - Evaluation
- Questions/Comments
- It seems like there are two key opportunities for CSAMP:
 - developing a CSAMP salmon plan for recovery
 - integrating/catalyzing existing efforts across watersheds
 - Recommend starting with developing the framework. Cataloging will help us identify a portfolio of actions that can be used. In parallel, use case studies to start on evaluation.
 - Concerned about this effort petering out (similar to Salmon Action Matrix) – need to be clear about what we're trying to achieve and what resources will be needed
 - Appreciate the idea of working with existing groups/efforts, but given broad scope they may not exist
 - Framework is key. CVPIA comparison could be really helpful. Encourage folks to consider how we will evaluate impacts