Next Steps in Response to the SDM Draft Round 1 Report Released June 6, 2024

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July 21, 2024

This report presents the outcomes of a remarkable four-year Structured Decision-Making collaboration among Delta Smelt experts, with a range of expertise and representing a range of interests, facilitated by Compass. The TWG's work was collaborative, creative, scientifically robust and professional. The report itself went through multiple drafts refined by innumerable comments from TWG members on both big picture conclusions and details. This should not be treated as just another report; it is a uniquely valuable product, representing a solid reflection of the state of knowledge about Delta Smelt, and new results from the best modeling tools available. The final version of the report represents the thinking of highly qualified experts as a group. Therefore it is a more robust weighing of evidence than alternatives from any one representative. More important than alternative conclusions is the question of what happens next? This work represents significant investments from all parties involved. What can we do to make sure that investment is not stranded?

The seven actions presented as next steps in the report represent an appropriate view of the state of knowledge and capabilities. I would venture that every TWG participant would have loved to have come up with a bold inexpensive action that would immediately reverse the decades-long trajectory of Delta Smelt populations. Based on this work, I think we can say with some confidence that no such simple "solution" exists. Augmenting each driver[1] comes with uncertainties as to how to do it. The report pragmatically recommends, in broad terms, next steps for important drivers. Beginning implementation of these seven steps, including adaptive

[1] Drivers in this context refer to food, turbidity, flows, and actions that increase mortality, like contaminants and entrainment.

management experiments, would be a bold next step toward a long-term strategy for recovering Delta smelt and otherwise improving ecosystem conditions in the Bay-Delta.

An important conclusion in the report is that recovery of Delta Smelt populations is conceivable. It would be ideal if one driver (e.g. augmenting food, turbidity, or flows) could bring about that recovery, thereby minimizing costs and difficult choices. Similarly it would be ideal if focus on a single region, or if intense focus in the next five years, were the answer. The TWG tested multiple focused strategies like these. Modeling of single actions, locally-focused actions and immediately available actions were informative, but none of these showed enough response to be confident they alone could result in recovery. The most positive responses were achieved in portfolios of actions that included augmenting food, increasing turbidity, augmenting flows *and* controlling sources of mortality like contaminants and entrainment; together. Eliminating one set of such drivers did not yield as much growth as portfolios of actions that combined the known drivers. Portfolios that expanded the spatial scale of actions like aquatic weed control; portfolios that will take considerable time to achieve (e.g. 30,000 acres of tidal wetland restoration) or that might require difficult political choices (e.g. summer outflow actions) resulted in the greatest population growth (go from left to right in Table ES2). That does not mean that doing all things with all drivers all at once (an impractical choice) is the only way to achieve progress. But the likelihood of recovery would be higher using a strategy that includes some augmentation or refinement of each driver over time, rather than focusing on only immediate returns, or one or two drivers. The report presents a framework for such a multi-faceted strategy. Further modeling and detailed planning will be necessary to fill in that framework. Many elements of that framework are not surprising, and at least some, if not most, are included in various proposals in progress or in planning. The models and the report provide evidence that moving together with these, in concert, is essential to optimizing investments in effective management. They provide evidence that progressively building from smaller actions, some of which are underway but insufficient themselves, is likely to be constructive and more effective than declaring today's actions a failure and starting over with untested concepts.

The professional judgement of uncertainty (Figure ES8) represents careful reflection on the state of knowledge and the limitations (and strengths) of the models. The TWG recognized that the data available for Delta Smelt have important limitations. The models were not able to quantify

all possible responses to different drivers. Not enough was known to quantify temperature, a potentially important driver. On the other hand, there is sufficient data to justify modeling, even if quantification of all possible relationships is not yet possible. The model outcomes are informed quantifications from the best available numerical tools representing a multi-expert view of the present state of knowledge.

Uncertainties are resolved in modeling by making informed assumptions. Informed assumptions do not negate the outcomes of the models; they result in outcomes that reflect our best understanding of the state of the science. It is important that readers not over-interpret the outcomes of the study. But the modeling does provide a framework of informed hypotheses that could benefit present management. The continued testing of these hypotheses could address important questions for both present and future management. Where specific interests seek more specific conclusions about questions such as quantification of the effectiveness of today's regulations, the groundwork is laid and the tools are available to undertake additional modeling. Collaboratively addressing specific questions about regulatory approaches is another possible next step facilitated by this framework.

The seven recommendations for next steps recognize that uncertainties impede immediately improving the state of specific drivers. For example, aquatic weed control could augment turbidity, which could accelerate any benefits from food produced by tidal wetland restoration. But we simply do not know how to constructively accomplish large scale aquatic weed control at this point in time, and we cannot quantify how much food for Delt Smelt (if any) will be produced per acre of wetland restoration. Small scale adaptive management experiments with alternative approaches (or in alternative places; or at alternative times) could begin to flesh out the understanding necessary to control aquatic weeds at a scale sufficient to make a difference. Further efforts at resolving the links between tidal wetland restoration and export of food could do the same. Recognizing adaptive experimentation as a next step is not a failure to take bold action. It is a realistic assessment of what must come next to make larger scale, bold actions effective.

Uncertainties about costs, effectiveness of actions and interactions among actions were large enough that the TWG chose not to rank cost-effectiveness of each action. "Ball park" costs give those considering an action a sense of costs more consistent with the degree of uncertainty. The

information is available in the body of the report to break apart monetized water "costs" (a narrow view of that driver) from physical costs of the action. This could provide a better sense of the cost question. Cost/benefit also might be narrowed as actions and costs are further detailed and modeled; another next step.

More model runs were conducted assessing sensitivity to different flow actions than with any other driver. The outcomes were informative both in terms of findings and in illustrating the complexity of evaluating such actions. The portfolios did not test the hypothesis that recovery could be achieved without management of flows and that was not a conclusion from this committee of experts. In fact, Tables 5 – 8 illustrate small positive population growth when Fall X2 was managed to distances less than 80Km in W and AN years (and moreso for the lowest X2's in summer). Just as important they showed negative effects (faster decline than observed historically) had X2's been managed in 1994-2014 to further distance than the current regulations (e.g. 87/88Km in Fall). The net benefit of management is the difference between the two. As noted above the benefits of flows were less evident if that single driver alone was managed (flow manifested as only salinity change) than if food was added to the mix (Table 7). The modeling raised intriguing hypotheses about how the timing of flow actions, or the number of years in which flows were augmented, could affect benefits to Delta Smelt. These same hypotheses might be applied to assess broader responses like specific ecosystem functions. Again, if effective use of water is a priority, then the present report sets the stage for further modeling and experiments as manageable next steps that could benefit future management choices.

This report, therefore, clarifies numerous opportunities for advancing efforts to recover Delta Smelt and benefit the Bay-Delta ecosystem. The set of recommendations are a stepping off point for new, informed, bold actions. The unanswered question is who is going to lead the effort to champion these findings, fit them into regulations and plans already in progress, help set priorities among the several possibilities for specific next steps and design/implement a long-term strategy that incorporates these recommendations for managing Delta Smelt into a larger ecosystem management strategy for the Bay-Delta? CSAMP participants sponsored a series of reports that had specific recommendations on leadership, modeling and decision support in this circumstance (Reed et al, 2021). The Independent Science Board (Wiens et al 2021) suggested

assembling a collaborative Adaptive Management Team that could work toward such a goal. CSAMP, if it were to continue, could provide an assembly point or impetus to work out how to take advantage of the guidance from experts in the present report and these earlier works. It could be argued that the Bay-Delta is at a hinge point as a new phase of management begins, wherein implementation of a next step strategy for ecosystem recovery could be feasible. This report frames part of a collaborative path forward; a frame that should not be left stranded.