

## Meeting Summary

### 1. Welcome and Introductions

The meeting was called to order at 9:02 a.m., August 1, 2014, by the Chair of the Delta Independent Science Board (ISB or the Board), Tracy Collier. All ten members of the Board were present: Brian Atwater, Steve Brandt, Liz Canuel, Tracy Collier, Harindra (Joe) Fernando, Jay Lund, Judy Meyer, Richard Norgaard, Vince Resh, and John Wiens.

None of the Board members made any new disclosures.

Delta Science Program (DSP) staff in attendance: Marina Brand, Peter Goodwin, Lauren Hastings, and Joanne Vinton.

### 2. Closed session: Discuss Lead Scientist recruitment. Not open to the public.

### 3. Reconvene open session

### 4. Delta Stewardship Council Executive Officer's Report

Lead Scientist Peter Goodwin gave the Executive Officer's report on behalf of Jessica Pearson.

Speaker Toni Atkins appointed Mayor Aja Brown of Compton to the Delta Stewardship Council (Council), replacing Gloria Gray, whose term expired.

The State Water Resources Control Board's [Phase 1 process](#) to review the San Joaquin River flow and southern Delta water quality objectives and [Phase 4 process](#) to develop and implement flow objectives for priority Delta tributaries will continue sometime in the fall. These processes have been delayed because of the need to focus on the drought.

Goodwin pointed out that the new Little Hoover Commission report, [Governing California Through Climate Change](#), mentions the importance of the Delta ISB. The report "calls on the Governor and Legislature to create a new state entity or enhance the institutional capacity of an existing organization to provide them the best and newest science and risk assessment methodologies as they evolve. The entity, however structured by the Governor and Legislature, should include an independent science board such as that which guides the Delta Stewardship Council" (page viii; see also page 53).

July 31 was the closing date for comments on the Bay Delta Conservation Plan Environmental Impact Report/Environmental Impact Statement (BDCP EIR/EIS). In their comments, several agencies cited the Board's report on the BDCP EIR/EIS, which was understandable and widely read. Board members might want to read some of the agencies' comments.

Meyer asked for news about the Delta Plan Interagency Implementation Committee. Hastings said that the next meeting is on November 17, 2014. The agenda is not yet set.

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**5. Delta ISB Chair's Report – Tracy Collier**

Collier gave his report after agenda item 6.

Collier and Lindsay Correa (DSP) are going to the [Lower Mekong Initiative Workshop](#) in Hanoi, Vietnam from August 18-22, 2014. They will discuss communication challenges between scientists and policy makers. Collier will represent the Puget Sound Partnership.

The Board discussed the possibility of using the drought as a teachable moment. The Board could write an op-ed with compelling examples. The op-ed could make the case for rapid response science. Many people contributed ideas for drought research at the Interagency Ecological Program workshop last February. Board members asked DSP to give them any written materials from the workshop. Hastings recommended that the Board read the [Drought Operations Plan](#). Resh suggested that the Board also read an [op-ed](#) written by Buzz Thompson, Stanford Woods Institute for the Environment. Atwater, Collier, and Lund will decide whether or not the Board can make a contribution to what has been done already, and will make a recommendation to the Board.

During agenda item 6, Clint Alexander told the Board that some of the data used when running the Ecological Flows Tool was not public. The data came from a public agency, the Department of Water Resources. Collier clarified that the data had not yet been released because they were from simulation runs that had not gone through quality assurance processes.

**6. Ecological Flows Tool – Ryan Luster (Nature Conservancy) and Clint Alexander (ESSA)**

Ryan Luster introduced the [presentation](#). He and Clint Alexander have been developing the Ecological Flows Tool (EFT) for over 10 years.

The Nature Conservancy started work on EFT in 2000. Habitats were changing on the Sacramento River, and riparian forests were not regenerating as they had historically. Pilot projects showed that the problem was the change in the flow regime caused by dams. More recently, new water projects have been proposed, such as building off-stream storage north of the Delta (Sites reservoir) and raising Shasta Dam. The question Luster and Alexander had was, if the water projects were developed and water operations changed, what would be the impacts to multiple habitats and species? Luster and Alexander developed Sacramento River EFT (Sac EFT) to answer that question.

Luster and Alexander developed Sac EFT between 2004 and 2008, but have continued to refine it. It covers the Sacramento River from Keswick Dam to Colusa. They developed Delta EFT between 2008 and early 2014. It covers Colusa downstream to the legal Delta. Their vision was to link existing hydrogeomorphic models in one decision analysis tool. Their [Final Report](#) summarizes all the work that they have done, including analysis of the effects of the BDCP EIR/EIS and building Sites reservoir. The report was published in April 2014.

Alexander continued the presentation. He said that EFT (Sac EFT and Delta EFT) was developed with help from over 70 Delta scientists, who also reviewed the work. He and Luster tried to find a balance between the amount of detail to include and the cost of including the detail. The results of the model would need to fit historical data and predict the future.

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EFT analyzes 13 species and includes tidal wetlands and invasive species deterrents. It uses 25 performance indicators, and evaluates reservoir operations, conveyance, bank protection, and gravel augmentation. A vetting process was used to choose the species to include. EFT does not include every important species or process. Floods, seismic events, and levee breaks are not built in. EFT is calibrated to the current Delta and how it works now. It is limited by what the linked physical models can do. Results from analyzing BDCP EIR/EIS are shown starting on slide 20 of the [presentation](#).

The presentation elicited a number of questions from the ISB. When asked about how EFT deals with the effects of a parameter – for example, flow, because flow impacts water temperature, turbidity, etc., and those are the factors that actually impact fish – the consultants indicated that the model does consider more than flow per se. In response to a question about the model being process based, linear, etc., the consultants responded that the model does not just use statistical relationships – particle tracking data, tidally averaged data, and biological and weighting distributions are used. In response to how the model deals with salmon migratory patterns and predation, the consultants said that the model looks at the migratory pathways based on the “fish go with the flow” idea. EFT also looks at indicators of predation risk. Extreme events are dealt with as a function of the criticalness of the rating.

EFT outputs are relative suitability ratings that categorize driving variables into poor, fair and good categories. This categorization allows one to roll-up the results and rank alternative operational scenarios, but it is also important to understand the spatial relationships. The next step is to evaluate all of the information and look for the weight of evidence which requires additional qualitative interpretation. EFT uses the longest historical series available (1939-2004) for the baseline, but does not account for a shifting baseline as they have not been able to find information on natural flows. As much historical data (establishes the suitability thresholds) as possible are used to select the reference cases and multi-decadal simulations are run. In some cases, as with the BDCP, the reference case is provided by the client.

EFT includes only data and relationships that have certainty. When asked if having more detail and the incorporation of sensitivity analyses to address the uncertainty really make a difference, the consultant responded that statistical significance does not necessarily indicate biological significance. They are fully aware of what is and is not in the model. The basic question is whether or not there is change.

Both the Sacramento and Delta EFTs were used in their [Final Report](#) to examine the effects of the BDCP. This contrasts with the BDCP consultants (ICF) who only used the Sacramento EFT in the Effects Analysis. The following analysis process was used: 1) an EFT simulation was run to establish the baseline, 2) the degree of change in physical variables was assessed, 3) the changes in EFT performance indicators using different methods were examined, and then 4) a weight of evidence analysis was performed to determine the net effects score. BDCP controlled the data and information that was made available. BDCP did not factor in the declining baseline (due to climate change) over time.

Real time decision models need more attention than the ones developed as planning tools. The consultants suggested shifting to a new paradigm where conditions are not made “good” for all species every year. Consideration should be given to making good conditions variable on a year-

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to-year basis so that over a 10-year period, the sum total is a benefit to all of the species. In other words, don't focus on a one-year time scale. The ISB noted that this paradigm shift has potential but would magnify the conflicts. When asked about expanding the complexity of the model, the consultants indicated that advances in food web work are important and should be high on the list for incorporation. The effect of climate change was incorporated into the EFT via CALSIM II.

The ISB liked the tool, especially the tradeoffs option (e.g., new paradigm), but questioned whether or not the region could deal with this from a legal framework and governance perspective. Running the model takes training, but existing results can be explored fairly easily using an EFT reader.

### **7. Lead Scientist's Report – Peter Goodwin**

Goodwin thanked the science community for helping to develop the Delta Science Plan and for working on implementation of the actions. While working with the Collaborative Adaptive Management Team (CAMT), Goodwin realized that the Science Plan does not include a process or guidelines for directed research. The CAMT is an opportunity to try out a new peer review process.

At the July 25, 2014 Council meeting, representatives of two independent science panels presented the [highlights](#) of the conclusions and recommendations contained in their reports to the State Water Resources Control Board. These workshops addressing “Delta Outflows and Related Stressors” and “Interior Delta Flows and Related Stressors” were held in February and April 2014, respectively. Sam Harader, DSP, was instrumental in structuring the workshops in a new way. Panelists were given important information before the workshops, and people who could answer related questions were invited to the workshops. The new format allowed for an important discussion about multiple stressor solutions.

The update to *The State of Bay-Delta Science 2008* is underway. The editorial board is meeting again soon.

The Interim Science Action Agenda is underway. Most interviews with members of the science community are complete. A rough draft for public comment is expected in late September. The challenge is to identify what the top actions should be.

The [Bay-Delta Science Conference](#) is scheduled for October 28-30. The program is not available yet, but Goodwin, Brandt, and Council Chair Randy Fiorini will be plenary speakers.

Consultants for the [Delta levee investment strategy](#) have been chosen. A scientific peer review panel will review the methodology used to develop a tool that will then be used to prioritize levee investments.

The topic of the [36th IAHR \(International Association for Hydro-Environment Engineering and Research\) World Congress](#) is Deltas of the Future. It will be held in Delft, the Netherlands, from June 28 – July 3, 2015. Related to this meeting is the desire to link major restoration projects around the world, not just through scientists, but also through agency staff.

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Council staff is writing an issue paper on habitat restoration. The paper cites the [Board's report](#) on habitat restoration in the Delta and Suisun Marsh. The Board might want to track how its report is used by the Council.

One of the outcomes of the [Environmental Data Summit](#) will be a white paper, which will serve as a road map or joint work plan showing how various organizations will work together to implement the paper's recommendations. Summit organizing committee members have asked for additional meetings. Goodwin asked the Board to review the white paper while it is still a draft.

The [11<sup>th</sup> International Conference on Hydroinformatics](#) is being held August 17-21 in New York. Hydroinformatics is a strongly interdisciplinary field that links water and environmental problems with computational modeling.

Fiorini and Goodwin presented a talk on the science and politics of restoring and managing the Bay Delta system at the [American Water Resources Association conference](#) in June-July. The conference theme was integrated water resource management.

Goodwin and Council Vice-Chair Phil Isenberg were invited to speak at the [NSF Xsede conference](#). They talked about the environment and how technology could be used to solve environmental issues. In the talk, Isenberg noted that the basic barriers and challenges have not changed over time. Isenberg will be invited to give his talk at a DSP brown bag lunch.

The modeling summit was planned for early 2015, but new funding sources might make it possible to schedule this year.

Future reviews organized in part by DSP will be about the Delta levee investment strategy and the CAMT process.

Council and DSP staffs are participating in a San Francisco Estuary Institute project on [indicators of estuary condition](#). The 2011 edition of the State of the Bay report will be updated to include the Delta in time for the 2015 State of the Estuary conference.

Council staff is working on implementation of the [Delta Plan performance measures](#). Staff is focusing on five policy areas and plans to issue a report by the end of this year.

## **8. Fish Conservation and Culture Lab – Joan Lindberg, Director**

Joan Lindberg, Tien-Chieh Hung, and Meredith Nagel described the programs at the Fish Conservation and Culture Lab (FCCL). To see their presentation, [click here](#).

The main program at FCCL is the Delta Smelt refuge program for genetic breeding and rearing, but the lab also raises Delta Smelt and Longfin Smelt for research, and it has a research program for reproductive biology, behavior studies, and growth and development studies on Delta Smelt. Research topics at the lab include:

- Conditions Delta Smelt prefer for spawning. The team set up spawning tanks with different substrates and water velocities, and studied 100 fish in each tank over two years. The fish tended to spawn on pebbles and preferred higher water velocities. Generally, pebbles are not found in the estuary. Sand and shells are found in the Sacramento River

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Deep Water Ship Channel and smelt are found there, but it is still not known what microhabitat the smelt use for spawning.

- Effects of light and turbidity on feeding, growth, and survival of larval Delta Smelt. Results from a study of larval Delta Smelt as they first start to feed showed that 1) the presence of turbidity and light triggered feeding in Delta Smelt larvae, 2) the survival and growth rate were higher for Delta Smelt larvae in the rearing trial with high turbidity conditions, and 3) the period when Delta Smelt fed on both rotifers and *Artemia* was shorter for larvae reared under low turbidity conditions.
- Effects of temperature and salinity on the choices of adult Delta Smelt. This project was done with Swee Teh of UC Davis. For the temperature experiment, the temperature was increased in the smelts' tank. The smelt could choose the temperature they preferred by moving between tanks. During the first 24 hours, the fish stayed in the same tank, but after 48 hours, they started moving to the cooler tank. Fish that were acclimated to 14 degrees Centigrade moved to the cooler tank when the temperature in their tank was increased to 23 degrees. Fish that were acclimated to 17 degrees Centigrade moved to the cooler tank when the temperature in their tank was increased to 25 degrees. For the salinity experiments, results showed that smelt can tolerate higher salinities, but move to lower salinities when possible. These studies may help scientists locate Delta Smelt in the field.
- Effects of winter food limitation on adult Delta Smelt and the next generation. This study is attempting to answer questions about the [Pelagic Organism Decline](#). The food limited fish were fed only four days per week for eight weeks. They ended up being smaller than the control group, which was fed every day, but were not necessarily less healthy. In the control group, more fish spawned more eggs. The number of eggs spawned for the control group was 114,440 more than for the food-limited group. Results showed that 1) smaller fish had fewer offspring, 2) food limitation may lead to differences in egg and larval quantity and quality, and 3) food limitation may impact population abundances in subsequent years. A fatty acid analysis showed that Omega-3 is important in growth, neural development, and immune system functions. Omega-3/Omega-6 ratios may have a pivotal role in egg and larval quality with the food limited group utilizing them more. Board members said that the results might be affected by the lab environment and could be different in the field. Brandt asked about an alternative interpretation of the results. Intra-specific competition was truncated during the experiments. A compensatory mechanism might allow good competitors to have a higher fecundity since they are the "stronger" fish. Collier said that in lab experiments, larger fish exhibit more dominant behavior, which can magnify differences in feeding and growth, which is not the same as in the natural environment.

## 9. Discuss the Charge to the Science Steering Committee (SSC)

Goodwin reported that the charge to the SSC was not ready to circulate, but is almost finished.

Formation of the SSC was suggested by the Friends of Science, a group of scientists who provided suggestions during development of the Delta Science Plan. The purpose of the SSC is to provide advice about science synthesis efforts as the state of knowledge of the Delta system is

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updated, provide advice on addressing decision-makers' grand challenges, and help identify and support shared approaches for synthesis. Members of the SSC are experts in their fields and do not represent their respective agencies. The SSC is a relatively small group, so not all areas of expertise are covered. The SSC has the flexibility to invite other experts as needed. Current members include Peter Moyle (ecology), Cisco Werner (modeling), Carl Wilcox (adaptive management), Jim Cloern (foodwebs), Steve Monismith (hydrodynamics), IEP lead scientist (currently vacant), Val Connor (water quality), and Josh Collins (Bay-Delta linkages). Representatives of other disciplines, for example the social sciences, will be invited on an as-needed basis.

The SSC does not have regular meetings. To date, they have met twice and discussed their Charge, development of the Interim Science Action Agenda, and updates to *The State of Bay Delta Science*.

Board members asked about representation for risk, Delta as place, and the system as a whole. No one represents these topics on the SSC. Goodwin invited the Board to suggest candidates.

The draft charge includes an explanation of the difference between the SSC and the Board.

Of concern to the SSC is a potential for conflict of interest when solicitations for research proposals are released by the Delta Science Program. The current suggestion is to model the SSC's conflict of interest approach after that used by the National Science Foundation (NSF). In that model and as an example, a group of people may write a white paper that is related to research topics of interest. The white paper is thoroughly evaluated and may have an impact on the next solicitation. The people who work on the white paper do not have a role in developing the solicitation or in evaluating the proposals. The white paper is just one of several sources of information used to develop the solicitation. The NSF is most concerned with financial conflict of interest. Goodwin asked the Board if this approach puts enough distance between scientists and solicitations in the Delta.

Canuel said that using the NSF model is a great approach because the SSC is just one source of information for the solicitation. Brandt said that in some agencies, such as the U.S. Environmental Protection Agency, anyone who has participated in the solicitation process is prohibited from submitting a proposal. If the SSC is setting priorities that are very different from providing just one of many sources of advice, DSP would need a separate way to set priorities. Brandt said that there is the true conflict of interest, which needs to be avoided, and also the appearance of conflict of interest, which is probably equally important to avoid. The process needs to be clear to the public. As currently written in the SSC's Charge, the SSC is advisory only and does not participate in establishing solicitation priorities or making funding decisions.

Atwater and Lund suggested renaming the committee from "Steering" to "Advisory" or "Consulting." Goodwin agreed.

## **10.ISB Program Reviews**

The program review teams met in small groups on July 31. Some teams interviewed agency staff; others worked on outlines for their reviews.

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**Fish and Flows – Brandt**

The team made progress in their intellectual understanding of the issues. They decided on a plan, a schedule, and an outline for the report. The report will start with a historical view of the fish and flows concept, the related management challenges, a synthesis of where they think the science should be focused, how well the scientific community is organized to address the science, and how effective the science communication is.

The first full draft of the report will be ready by September 1. This first draft is for the team members only. By the end of September, the team will have a readable draft. By October 24, the team will send a public draft to the rest of the Board and present the report to the Board at the October 31 in-person meeting. They will ask for comments by November 10 and present the report to the Board again at the November teleconference. They hope to have the draft final report finished by December 1 and ready for approval by the Board at the mid-December in-person meeting. The ability to meet this deadline will be a function of the extent of comments received on the draft. If the December deadline cannot be met, then they hope to complete the report January 2015.

Collier asked to see the readable draft, too, instead of waiting for the October public draft. The team will send the readable draft to individual Board members for comment.

**Adaptive Management – Wiens**

The team's first step is to develop a [survey](#). The team wants to finish the survey by mid-August and distribute it based on recommendations from DSP. The purpose of the survey is to get specific information about how programs are (or are not) pursuing adaptive management (AM) and how agency staff think about AM. The team expects significant differences and wants to understand the differences. The team will assimilate the results of the survey and identify a subset of the respondents to interview in person for greater depth over the next six months or longer. They will then prepare a report. Board members will be more proactive and participatory for this review, instead of just evaluating a program.

After the first set of interviews the team will choose a few respondents out of the original subset who seem ready to advance AM in terms of thinking, planning, or interpretation. The team is proposing to work with and advise this smaller group of respondents, if needed.

Wiens invited Board members to send comments to him about the draft plan and survey. The team will start by sending the survey to staff at the agency level instead of trying to reach every manager in every agency. The team will encourage respondents to share the survey with others. Goodwin recommended that the team talk to Lindsay Correa (DSP) about information she has collected from agencies for the Interim Science Action Agenda.

The team will not look for information about other areas with successful AM programs, although they have collected literature on small projects where AM did not work.

Norgaard suggested loosening the survey's request for a science plan, which could discourage respondents if they do not have one. He also said that decisions about AM might not be made by just one person, but might be arrived at by consensus. Atwater is concerned that the Board might be asking agency staff for too much paperwork. He gave an example of a lively in-person

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interview with one person that expanded to several people where he and Norgaard learned a lot. He thinks that talking is more productive than surveys.

Collier summarized by saying that the team will not send the survey out broadly and will inform the Board who it will be sent to before sending it out.

### **Water Quality**

Canuel said that the team is at a very early stage. They are thinking about how to frame the review. While reviewing the water quality chapter for the BDCP Draft EIR/EIS, they learned that water quality means different things to different communities. They are considering the beneficial uses of water for agriculture, municipalities (drinking water), and ecosystems. One general question is how water quality data are used by different communities to support managers.

The team has interviewed Lauren Hastings (DSP), Sam Harader (DSP), Rainer Hoenicke (DSP), Anke Mueller-Solger (US Geological Survey), and Val Connor and Stephanie Fong (State and Federal Contractors Water Agency). They learned that some topics, such as pesticides and toxic contaminants are not being covered. They heard concerns about the proposed diversions north of the Delta and what effects those would have on water quality.

### **Water Supply Reliability**

Lund is the only Board member working on this review, so he thinks it will be hard to finish in a timely way. It is one of the coequal goals, so it is important. It might be necessary to bring in outside experts who do not have a conflict of interest. Norgaard and Atwater might help.

### **Delta as Place and Levees**

Norgaard explained that Delta as place and levees are related, so he and Atwater decided to work together. On July 31, the team met with staff from the Delta Conservancy, DSP, DWR, and ARCADIS. The team does not have a good idea of how the review will proceed. Agency staff was not able to give advice about the best people to talk to or how to get the best information. Concerning levees, the [Delta levee investment strategy](#) is underway and required by law. Another request for proposals was released from DWR worth tens of millions of dollars for levee work to support habitat improvements (vegetation on levees) and water reliability. This work will start before the levee investment strategy is finished.

The U.S. Army Corps of Engineers decided that the federal government has no interest in levee improvements in the Delta on the basis of their benefit-cost analysis. The Corps also decided that they can improve habitat by putting dredge materials near the edges of Big Break and Franks Tract. The latter is under discussion with the Council because the proposed improvements might not fit in with larger plans.

Concerning levee investments, decisions will need to be made about whether or not (or to what degree) priorities should depend on the value of the land that the levees protect. When levees are weak, landowners might not invest in the land to make it more profitable, so it is worth less. If the land is worth less, then levees might not be improved to protect the land. It becomes a “chicken and egg” problem. Norgaard suggested that it would be better to talk about levee strategies instead of prioritization, especially because of the interconnectedness of the islands.

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**Summary of review schedule**

“Fish and Flows” has an aggressive schedule with the goal of finishing the report by the end of 2014. Adaptive Management has a process that will start soon. Water Quality will decide who to talk to and interview people over the next six to eight months. Water reliability will be deferred to a later time. Delta as Place/Levees will stay involved with discussions about the levee investment strategy. Lund encouraged Board members to slowly ramp up their knowledge about levees because they will probably be asked to review the investment strategy.

**11. Public Comment (For matters that were not on the agenda, but within subject matter jurisdiction of the Delta ISB.)**

None.

**12. Meeting outcomes**

A teleconference will be held sometime on October 1. The next in-person meeting is October 31, which follows the 2014 Bay Delta Science Conference.

**3:39 p.m.—Adjourned**