California Bay Delta Authority
Independent Science Board Meeting
California Bay Delta Authority, Bay-Delta Conference Room, Sacramento, CA
Tuesday, September 21, 2004, 8:30 a.m.–5:00 p.m.
Wednesday, September 22, 2004, 8:30 a.m.–5:00 p.m.
Thursday, September 23, 2004, 8:30 a.m.–5:15 p.m. (Field Trip)

Action Items

Open Meeting Act/Conflict of Interest

1. Staff will meet with counsel to:
   - Outline a working process for drafting documents (i.e., Is input from less than a quorum permitted?)
   - Clarify issue related to remote interest associated with private universities (i.e., Should those ISB members at private universities not participate in any discussion of the PSP process given that a colleague from their university might apply to the PSP once it is issued?)
   - Further explain COI related to attending workshops (e.g., When are ISB members acting in an ISB public capacity and when are they not? Generalized suggestions about research priorities are often suggested to management by workshop reports, but are only a part of the input to a PSP.)
   - Consider legislative options.

ISB Activities

DIP Subcommittee

2. Establish two 2-person teams for joint fact-finding associated with monitoring and modeling:
   - Modeling – Melack and Koseff
   - Monitoring – Glaze and Meyer

ERP/EWA Subcommittee

3. Staff (Castleberry, Guinee, Campbell) will prepare a briefing paper to the EWA/ERP Integration Subcommittee and this paper may be shared with the full ISB. The Subcommittee will report back to the ISB at next meeting.

Levees Team

4. Motion to release intellectual property rights (see Agreements below).
5. Mount will provide his preliminary presentation at the CALFED Science Conference.
6. Mount will send a draft manuscript to a few ISB members for preliminary review prior to the November meeting.
7. If after further discussion of levee issues, the Board develops significant findings relevant to the CBDA program, a draft ISB report on the subject, including discussion of science implications, will be developed and circulated to all ISB members for review and comment (Moore to clarify quorum issues). After ISB review, the ISB report will undergo outside peer review which will be organized by the Science Program. Scientific and policy implications related to levees may be discussed at the next ISB meeting.

Science Program Activities

8. Staff to provide a broader picture of investments in science in other CALFED programs to complement the Science Program Financial Plan.

9. ISB Team (Cummins and Rose) will work with Lead Scientist on the legislative request regarding development of a plan to determine water requirements to restore listed and threatened fish species. Lead Scientist will present a draft Plan to the ISB in November.
10. Lead Scientist will clarify potential conflict of interest concerns related to ISB members working on the Science Strategic Plan. Consider ISB involvement in strategic planning for the Science Program at the next meeting.
11. ISB members are invited to send information on new members (resource economist, risk assessment) to the Lead Scientist, who will consult widely and make the final decision on new members.

Administrative

12. Staff to finalize dates for three ISB meetings in 2005.
13. Staff to invite Dr Antonia Baptista of Oregon Science University to make a presentation at the November meeting on the applicability of Data Assimilation Systems to large environmental management programs such as the CBDA restoration program

Agreements

Set the Draft Operating Guidelines and revisions to the Charge aside and re-visit them in three or four meetings in order to give the ISB additional work experience in terms of defining specific roles for the ISB, especially in relation to the other Science Boards.

The ISB releases today's levee presentation to Mount as his personal intellectual property provided that acknowledgement for support is appropriately noted. It is the ISB's intention to utilize the information provided in the presentation to produce a full ISB report/product at a later date.

Agenda for November 10-12, 2004 ISB meeting

The next ISB meeting will be November 10, 11 & 12, 2004. The afternoon of November 10 will be reserved for Subcommittee work sessions. ISB meeting will end Friday, Nov. 12 at noon.

The ISB members discussed a desired agenda for the next meeting and arrived at the following preliminary agenda:

- Presentation on data assimilation system and new modeling/data analysis technologies. (Example: Columbia River Estuary)
- Levee Team and potential policy implications.
- Report from DIP Subcommittee
- Report from EWA/ERP Subcommittee may include a duplicate of the oral presentation Rose will have just given to EWA panel, summary of results.
- Science Program Update including status of legislative request on water supply, new members, strategic planning for the Science Program
- Report from Performance Measure Subcommittee (*Cummins, Ingram, Meyer, Reed, Keller*)

The chair and vice chair will work to further develop the agenda.

Future ISB Meeting Dates (tentative)

– Feb. 22-23
– May 10-12 or May 17-19
– Sept 20-22 or Sept 22-29
– Oct 25-27
– Dec 5, 6

Other Upcoming Meeting Dates

– CALFED Science Conference, October 4 – 6.
– EWA Year 4 Review, Nov. 8 – 10.
– Restoration Conference December 6 – 10 (Orlando, Florida)

Handouts

– *Memo from Jack Keller, Scott McCreary, and Eric Poncelet to Johnnie Moore, Lead Scientist, CALFED Science Program, regarding Nominations for the Water Management Science Board*. Keller. Handout.
– *Water Management Science Board (WM-SB): Some Cross-Program Element Issues/Questions*. Keller. Handout.
– *WM-SB Nominee Biographies*. Keller. Handout.

Presentations

– *CVPIA/CALFED Coordination.* Darrin Thome.
– *Delta Operations 101*. Curtis Creel.
– *Ecosystem Restoration Program Overview*. Dan Castleberry.
– *EWA Technical Review Panel: Organization and Workings*. Kenny Rose.
– *Overview of EWA,Coordination and EWP.* Roger Guinee and Dave Harlow.
– *Overview of Sacramento-San Joaquin River Delta Water Quality Issues* Fred Lee, Ph.D., member of the Public.
– *Performance Measures: A Quick Update*. Tom Gohring.
– *Subsidence, Seismicity, and Sea Level Rise: Impacts on the Delta, CBDA Programs and the Science Agenda*. Jeff Mount and Bob Twiss.
– *What the ERPSB is, and how it is different from ISB.* Bob Twiss.
– *History of Water Quality Standards in California*. Jerry Johns.

Meeting Summary, September 21, 2004

ISB Members in Attendance

Tom Dunne, Ph.D.	Jeff Koseff, Ph.D.	Duncan Patten, Ph.D.
David Freyberg, Ph.D.	Sam Luoma, Ph.D.	Denise Reed, Ph.D.
Bill Glaze, Ph.D.	John Melack, Ph.D.	Kenneth Rose, Ph.D.
Helen Ingram, Ph.D.	Judith Meyer, Ph.D.	Robert Twiss, Ph.D.
Jack Keller, Ph.D.	Jeff Mount, Ph.D.	

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ISB Members Absent

Ken Cummins, Ph.D.

CBDA Staff

Virginia Cahill	Johnnie Moore, Ph.D.	Kim Taylor, Ph.D.
Dan Castleberry	Tim Ramirez	Patrick Wright
Zach Hymanson	Rhonda Reed, Ph.D.	
Jana Machula	Chris Stevens	

Agency Staff

Campbell Ingram (EWP)	Jerry Johns (DWR)

Invited Guest

Gary Hunt

Stakeholders

Gary Bobker	Bernie Sullivan

Consultants

Suzanne Gilmore	Diana Roberts
Kateri Harrison	Elizabeth Soderstrom, Ph.D.

Meeting convened, 8:45 a.m.

Welcome (Dunne)

Dunne welcomed everyone and introduced Elizabeth Soderstrom as the new meeting facilitator. Members of the public who wished to speak were invited to complete a blue comment card. In response to questions from Dunne, Gary Hunt (BDPAC Chair and Committee representative to the California Bay-Delta Authority) clarified that the ISB has two roles (1) as an oversight or review board, and (2) as an activist board that identifies gaps in science. Hunt emphasized the need for objective scientific involvement and the need for the ISB to remain "independent".

The meeting summary of the April 22–23 ISB meeting was approved with the correction noting that Koseff was present on April 22.

Overview of Bagley-Keene Open Meeting Act 2003 (Stevens and Cahill)

Chief Counsel CBDA Chris Stevens and Deputy Attorney General, State Department of Justice Virginia Cahill indicated that the Science Program's Policy on Conflict of Interest (COI) and Bagley-Keene Open Meeting Act cover the basic principles of meeting access and conduct, including requirements that subcommittees of three or more ISB members have open and publicly noticed meetings.

Stevens and Cahill advised that ISB members avoid serial meetings including sequential e-mail exchange and telephone calls. In general, they advised avoiding email exchange regarding agenda items, and recommended deliberating in public instead. ISB members may bring fact-specific questions/comments to the Lead Scientist who can respond and share pertinent information. Information that is distributed to the ISB (or more than a quorum) becomes part of the public record.

Discussion

Meeting agendas should be specific enough to allow the public to attend topics of interest while general enough to allow new or related ideas.

Draft documents may be sent to less than a quorum of ISB members for comment. If the draft document needs to be distributed to more than a quorum of Board members, it may be posted on the ISB website for distribution to the ISB and to the public. Dialogue or e-mail about the document should not take the place of deliberations in public. Generally, draft documents should be included as part of the ISB's pre-meeting packet and ISB member comments and discussion should be provided during the public meeting.

ISB members noted the difficulties created by the Open Meeting Act, given that the scientific process requires an intellectual exchange, scientific inquiry, blending of complex perspectives, and an analysis of technical flaws before a document is made public. The draft paper by Mount and Twiss on levees was noted as an example of these difficulties. Wright noted that it was not the intent of the legislature or administration to stymie the scientific process and that the current process may not work for the ISB.

It was noted that the EPA Advisory Science Board operates under similar open meeting rules and relies heavily on staff to collate the results of meetings and conference calls. However, CALFED does not have this level of staff support available. Major concerns were raised about inefficiencies and significant restraints presented by the Open Meeting Act and related processes to the ISB's ability to fulfill its charge.

CDBA counsel expressed understanding of the unique needs of the ISB and agreed to work with the Lead Scientist to develop solutions for these issues and concerns. Parts of the solution may include differentiation between information exchange and actions, and may include approaching the legislature with an alternative model allowing for more flexibility where appropriate for the ISB. Staff will research the various options and discuss them with state attorneys and members of the Authority.

Conflict of Interest Policy (Moore)

Staff and CBDA counsel provided a brief overview of the Conflict of Interest document outlining specific categories which may apply to individual board members. If ISB members have a clear financial interest, it is strictly prohibited to be involved with a PSP or similar grant solicitation processes. Board members should direct any fact-specific questions to the Lead Scientist or to Chris Stevens.

Discussion

General discussion involved the concepts of financial interest when making scientific recommendations. The purpose of CALFED's science boards is to recruit the nation's best scientists, if they must recluse themselves from crucial discussions, then the program is not doing what the public needs. Considering that CALFED is involved with a range of agencies, unknown conflicts may exist and additional clarification is needed.

Chris Stevens and Virginia Cahill agreed to give additional thought to the issues of remote interests for those ISB members that work for private universities and to Board member participation in workshops when the results of those workshops may be part of a long chain that eventually leads to a PSP. Staff agreed to consider the development of future PSPs that generally describe the type of science needed, with no relationship to specific applicable studies.

Disclosure Statements (Dunne)

ISB member disclosures and affiliations (with the exception of five board members) are posted on the ISB website at http://science.calwater.ca.gov/sci_tools/isb.shtml

The five Board members whose disclosures and affiliations were not yet posted on the website provided a verbal disclosure. Patten noted his ERP contract includes a riparian white paper which could be considered a non-competitive contract. Mount stated that he is currently Chair of a panel for the North Delta Improvements Project which involves an EIR process. Meyer stated that she is Chair of the scientific and advisory committee for American Rivers. Rose was recently reimbursed for attending the EWA workshop. Glaze stated he has no present conflicts and noted he has been invited to serve on the Water Management Science Board. Keller noted that his statement was recently posted on the website.

Director's Update (Wright)

The U.S. Senate passed a CALFED authorization bill last week. Differences between the House and Senate versions of the bill remain, particularly those relating to pre-authorization of water storage projects. It is hoped that an agreement will soon be reached. Funding for the levee and water quality programs is behind schedule and imbalances among the programs will be addressed within the next few sessions. If the bill is successful, it will confirm the state-federal partnership and CALFED will remain a state entity with federal participation. In summary, it is hoped that federal funding for CALFED will be provided.

The last Authority meeting had two significant approvals: (1) 2004 Program Plans, posted on the CBDA website, containing goals, objectives, and accomplishments since adoption of the ROD; and (2) Delta Improvements Package, approved as a framework document with the intent to develop linkages between DWR's expansion of permanent pumping capacity and water quality, biological opinions, and other relevant parameters.

Prior to the December Authority meeting, staff will draft a comprehensive finance plan for the entire program, including cost estimates for project completion, quantity of money from various sources, identification of funding gaps, and potential sources to fill these gaps. It has been suggested that the finance plan be re-evaluated every 2-4 years rather than locked in for a 10-year time period. The Levees program may be subject to closer scrutiny during this process.

Trends in water diversions have changed since adoption of the Water Accord, and this trend is part of the debate associated with the Delta Improvements Package. The underlying premise of the ROD is to expand the flexibility of the pumps by pumping water during those times when fish are less vulnerable to loss. The Bobker memorandum questions whether this enhanced pumping

capacity and flexibility is sustainable over the long run. Other debates focus on the question of whether the Delta really can serve as the hub of California's state water system, while still protecting fish and prime agricultural land. It would be helpful for the ISB to provide insight on these topics to the three policy forums (DIP, state standards, and Delta levees) and to think fundamentally about the Vision for the Delta.

The Delta Wetlands project is on hold because stakeholders are not comfortable providing additional funding to this effort, given the findings of the Science Panel and the Economic Review Panel. Luoma noted that this project received a truly independent review that provides objective information to the public. Scientific review was completed early in the process, but has not been discussed further due to the program's need for economic partners and input.

Staff is continuing efforts to incorporate additional scientific and peer review into Program Plans. Agencies such as DWR and the Bureau of Reclamation authored the Program Plans and submitted them to CBDA staff for review. ISB members are encouraged to read the Program Plans.

Science Program Update (Moore)

Moore noted that the Authority has appointed Tom Dunne and Sam Luoma as formal ISB members. The CALFED Science Conference scheduled on October 4-6 will likely be a success with 600 registrants and 190 abstracts. PSPs for the Science Program and the ERP are publicly available at: https://solicitation.calwater.ca.gov.

Workshops:

- Rivers, Rocks, and Restoration Workshop in July 2004
- EWA first 4 years, September 8-9
- EWA Review, November 8-10
- Possible water quality workshops next year

Legislative Directive

The California legislature has given CALFED, and in particular the Science Program, a deadline of January 10, 2005 to devise a plan for the development of a research agenda regarding how much water is needed in the Delta for dependent endangered/threatened fish species. Moore hopes ISB and ERP Science Board members will help develop this plan. The plan may call for something similar to the Mercury Strategy with a large scale, system-wide approach which will include public workshops.

ISB members noted that this legislative directive raises several questions, including

- What is the cumulative risk and uncertainty within the Delta?
- What is the minimum amount of water required for full recovery of fish?
- Who will allocate the water?
- How do water and fish interact with the entire biogeochemical system?

Luoma noted that the way to address these questions is to construct a plan for the research and for a constructive scientific dialogue that will reframe the debate around the important issues. Existing studies can form the foundation of the future research agenda, and preparation of background documents on these issues may provide an opportunity to educate the legislation about the complexity of the system.

Bobker noted that the Legislature is concerned because the dueling conceptual models for the Delta have not yet been resolved. Increased water pumping has been proposed, but hydraulic alterations and ecosystem needs have not been clearly identified.

Two ISB members (Cummins and Rose) will assist Moore, along with others, to formulate an approach and submit a draft Plan for comment to the ISB at the November meeting. Staff will incorporate suggestions from the ISB and others before the January 10 deadline.

Ten-Year Finance Plan

Moore identified three major future efforts included in the 10-year Finance Plan request for the Science Program.

1. Identifying important scientific issues (~$3.5 million)
   - Support for ISB and staff identification of issues
   - Workshops
   - Staffing levels
2. Investing in critical unknowns (~$24 million)
   - Grant program via a yearly PSP
   - Post doctoral scholars and graduate fellowships
3. Scientific communication (~$2.5 million)
   - Between CALFED and agencies and general public
   - Within the scientific community using conferences and on-line journal
   - Communication coordination within the CBDA
   - Monitoring and design review

The ISB requested that staff provide information regarding the total investment in science throughout CALFED, with the intent to identify other leveraged funds.

Performance Measures

Tom Gohring outlined a schedule for development of performance measures, noting that these measures can help determine whether investments have been effective. Three levels were identified:

1. Administrative Actions
2. Direct outcomes (fish counts, observed water conservation)
3. Indicators inferred from basic data

ISB discussion noted that the broader CALFED approach drives governing questions such as: Are water supplies more reliable? Is drinking water quality improving? Are levees more reliable? Is the ecosystem restored? Choosing specific metrics to measure and track is a challenge. One approach is to utilize existing data and track metrics for which we have data. Science-based monitoring guidelines are needed that would provide guidance on what is needed in both short and long-term monitoring programs.

New ISB Member Recruitment

Moore suggested two disciplines be added to the ISB: (1) Risk/Decision Analysis and (2) Environmental/Resource Economics.

Science Program Strategic Plan

Moore introduced the idea of the Science Program developing a long-term Strategic Plan and the possibility of ISB members contributing to the development of the Plan.

Delta Water Quality Standards: Lunch Presentations

Taylor provided an introduction to water quality standards and their relation to monitoring efforts and CALFED.

History of Water Quality Standards in California (Johns)

Jerry Johns, DWR, provided a verbal presentation outlining broad issues related to history of water quality standards, including lawsuits in the early 1900's, attempts by the city of Antioch to divert water, the first comprehensive California Water Plan in 1957, and the establishment of water rights. Johns noted that the Water Code's D-1485 fish and wildlife conditions which regulate CVP and SWP Delta operations were imposed under a reservation of SWRCB's jurisdiction.

The State issued the first water rights permits to the USBR for operation of the Central Valley Project in 1958 and to DWR for operation of the SWP in 1967. Key features of these water rights permits were the ability to divert water from the Delta and to send it west to the San Francisco Bay area and to central and southern parts of the state. The permits issued for the CVP and SWP reserved jurisdiction for the State to formulate or revise terms and conditions relative to salinity control, to impacts on vested rights, and to fish and wildlife protection in the Sacramento-San Joaquin Delta. The State Water Resources Control Board has a dual role of both issuing water rights permits and regulating water quality.

The CALFED program is struggling with how best to engage in the standard review process. Issues include fish, especially the Delta smelt, VAMP, X2, salinity, and water temperature.

ISB discussion focused on the issues of riparian rights and appropriative water rights and the goal to provide a scientific foundation for water rights. It was noted that the State Water Board's involvement in CALFED has been limited to date.

Water Quality Objectives for the San Francisco Bay Estuary (Kimmerer)

– *Water Quality Objectives for the San Francisco Bay Estuary: Scientific Basis & Status.* Kimmerer. Presentation.

Kimmerer's presentation discussed the scientific basis for X2 and flow standards. X2 is an index used to assess the location and thus movement of salinity inland from the ocean to the Delta and is defined as the distance in kilometers inland from the Golden Gate Bridge to the area where a salinity of 2 parts per thousand is found. Flow dynamics can be directly correlated with X2 measurements just as flow can be correlated to various other scientific parameters. As flow patterns are dominated by tides, there is variation in biological species with respect to X2. At this point, we have the basis for the standards and the relationships, but now we need to understand how they work.

There is some level of skepticism regarding the E/I ratio in the context of a tidally influenced system. Modeling studies which are in progress to track particles suggest a high level of fish entrainment at the pumps (radio tags suggest that fish do behave like particles). The freshwater supply during low summer flows is provided for agricultural uses, and tends to be more fresh (as well as less variable) than historical data suggests. Data assimilation models of the system currently do not integrate real time measurements. There is opportunity to improve real time computation and integration of data.

Delta Operations (Creel)
– *Delta Operations 101*. Creel. Presentation.

Creel stated that operational decisions for the Delta are based on five parameters:

1. Exports
2. Flows
3. Control structures
4. Water Quality (monthly conductivity, daily chloride titrations)
5. Fish

To comply with regulations, there are three basic techniques in operational procedures: (1) change reservoir releases; (2) change export amounts; and (3) change flow patterns (salinity control gates, cross channel gates, and barriers in the South Delta). All data is captured monthly for QA/QC and hourly for operations. X2 requirements are measured by electrical conductivity at three different stations.

Discussion
While the decision documents describe the State Board's reasoning for the standards, some extrapolation is necessary. This fact, coupled with the fact that the EIR/EIS is 10 years old, suggests that they should be reconsidered.

Different water quality standards are applied differently month-to-month and year-to-year, based on median forecasts for a hydrologic year. Forecasts are based on snowmelt and remote sensing data. A particular standard may be more or less sensitive to dry/wet time periods compared to other standards. A wet year is defined in 1641; if the climate is drier, costs increase and water supply for all State and Federal water contractors becomes more difficult to guarantee. Science (as part of the ISB or other processes) can help answer the question whether standards for other parameters such as organic carbon or nutrients need to be considered.

Creel indicated that additional analysis and scientific information are needed to inform water managers where the fish are located and how they are predicted to respond to various operations.

CALSIM (which has a monthly time-step) and other modeling systems do not have enough detail to model the location of the spring run or the estimated size of individual fish within a population. CVPIA requires a dedication of water for environmental uses including upstream flow and downstream temperature requirements.

Public comment by Bobker focused on use of adaptive management techniques versus prescribed standards, noting that the unique X2 approach, including correlations and methods, could be applied to other types of water quality standards. Operational decisions to meet some standards and not others create legal, scientific, and policy problems. Bobker suggested refinements to water operations be considered in order to reflect more sensitivity to the ecology of the Delta and Estuary.

Many of the standards apply to the entire estuary. Linkages among the various standards are difficult to obtain because the State Regional Water Quality Control Boards work within specified regions with variations in supply and water rights. While today's ISB discussion focused only on standards related to water quality operations, upstream standards (such as temperature near Lassen) can constrain flows downstream. Since 1994 there has been a gradual trend away from prescriptive standards towards more flexible tools such as EWA and X2.

DIP Discussion in context of Water Quality Standards (D. Reed)

Assessing real-time data and developing more flexible operations may not work in this case due to a lack of data and analysis. Instead, the ISB's diverse expertise may help provide some guidance on integration or on the development of conceptual models to support future changes to the regulations. Modeling in a complex environment with many variables is difficult. CBDA's role in the regulatory process needs further clarification. Wright suggested several ways that the Science Program could help the SWRCB develop policies in a more collaborative, science-driven way; however, this is dependent on the SWRCB's schedule and interests. These include the following.

- Considering the basis for the standards and determining whether they have held up over time.
- Evaluating or creating conceptual models for standards.
- Determining the inter-relationships between standards.
- Determining what kinds of additional data, information, and analysis are needed.

The larger question for the Science Program and the ISB is how to reform the planning process so that it is informed by scientific principles.

EWA/ERP Integration (Rose)

Rose, as Chair of the ISB Subcommittee on EWA/ERP Integration, discussed the EWA and introduced the speakers: (1) Roger Guinee, Overview of EWA; (2) Dan Castleberry, Overview of ERP; and (3) Robert Twiss, ERP Science Board. The power point slide show provided by each of the guest speakers is posted on the ISB's website.

- http://science.calwater.ca.gov/sci_tools/isb.shtml.

ISB discussion included participation of all guest speakers as well as meeting attendees.

Overview of EWA (Guinee)

There will be a review of the EWA program in November. USFWS is the implementing agency. EWA is designed to protect fish in the Bay-Delta estuary beyond the regulatory baseline. The EWA has coordinated with WAP[b3] releases on the San Joaquin tributaries and the CVP[b2] export reductions during the VAMP program (April 15–May 15). Weekly coordination takes place all year with water managers, agencies, science advisors, and other interested parties. EWA is currently paid for with funds from Prop 50 and Prop 204. The EWA has had a budget of $30-40 million per year during the first four years. Discussions will take place to extend the EWA program for at least 3 years and possibly 7-10 years.

The EWA and the EWP are separate programs. The goals of the EWP are principally focused on improving ecosystem conditions in tributary streams by increasing instream flows during key periods. The EWP acquires permanent water supply and is funded by the ERP program within CALFED, whereas EWA provides flexible water supply response to reduce impacts on fish in the Delta. An analogy was made to characterize the EWA as "rented water" whereas the EWP seeks to "own" water to provide permanent flows to restore fish populations and/or habitat. EWP water actions are designed to test hypotheses and includes adaptive management. In addition, the EWP is in its formative years and is a much smaller program than EWA.

Overview of ERP (Castleberry)

Castleberry's presentation provided an overview of ERP and noted that the ERP has three implementing agencies, USFWS, DFG, and NOAA. The ERP's planning foundation is provided in several documents including the ROD, Strategic Plan, ERP Program Plans I and II, and the Multi-Species Conservation Plan. These planning documents provide the ERP with goals, objectives, targets, milestones, and actions. A recent Milestones Assessment found that the

program is currently on schedule for 84% of the milestones, ahead of schedule for 3%, and behind schedule for 13% of the milestones.

EWA Review Panel (Rose)
Rose provided an overview of the EWA Review Panel and stated that during their annual meeting, the panel receives a detailed review describing when water was released and considers whether these management decisions were sound. The 2003 review noted new challenges around long term opportunities and risk. The 2004 review will be cumulative. The most challenging issue is defining program success.

Data used for the EWA Review Panel is from the IEP monitoring program. VAMP and other specific projects contain a separate monitoring component. Originally, the EWA was focused on the operations and take at the pumps, but due to the Panel's efforts, agencies are now open to considering population indicators such as carcass counts and utilizing other tools that are more critical to species recovery. Implementation of recommendations by the Review Panel tends to be limited by lack of qualified personnel. For example, it was noted that a lack of staffing and funding prevents more detailed population modeling of species life-stage to identify bottlenecks in the system.

There are many areas of overlap between the ERP and EWA programs. For example EWA acquires water in many of the same locations that ERP conducts restoration. Science is used in both programs, although differently—EWA has a Review Panel and ERP uses a PSP mechanism. It was noted that the EWA is politically successful because it is flexible and provides benefits to all parties, including a financial incentive to organizations willing to sell water.

ERP Science Board Charge, Role, Operations and Activities (Twiss)
The ERP Science Board's focus is to highlight the scientific basis and research needs of topics that lie at the root of policy questions. The ERPSB is currently involved with clarifying the scientific basis for adaptive management, DRERIP, low-resolution modeling, vision for the Delta, and review of the Yolo Bypass.

The ISB noted opportunities for integration between the ERP and the EWA, including:

- Working together to meet the water needs of fish and plants, which often have variability in their annual hydrographs, meaning that an irregular water is needed.
- Integration across geographic scales, considering that in altered systems, actions at diversion sites may affect natural habitats elsewhere in the watershed.
- Studying relationships between the number of fish saved due to water releases and the related improvement of habitat (i.e. due to increased flow).
- Identifying joint data needs and pursuing them.
- Recognizing water as the common factor between the two programs and using that as a lever.

ISB Operating Guidelines (Twiss and Ingram)
Twiss and Ingram provided an introduction to the ISB's Draft Operating Guidelines and draft modifications to the Charge (pre-meeting materials, Attachment G). The ISB asked staff to clarify relationships to other science boards within CALFED, noting that the graphic provided within the draft document was not sufficient for this purpose. Overlapping membership among the various boards will assist in the identification of commonalities and gaps between the boards.

The ISB requested additional clarity regarding their scope of work, types of reports to produce, types of advisement needed and what workshops to organize. In general ISB members preferred

to have tangible products and topics identified for upcoming year. Meyer suggested that these concerns be addressed by completing two specific tasks:

1. An annual work plan for the ISB
2. A report on the state of science every two years

It was noted that collaboration with other Boards would be needed to develop a report on the state of science. This report could also suggest new directions, or expansion of existing programs.

ISB members noted that their dual role of serving in both a review and activist capacity is substantial and could include providing analysis, projecting next steps, and identifying potentially important future problems. Specific issues that the ISB could address over the coming months include performance measures, EWA/ERP integration, and DIP. It was noted that given the small staff in the Science Program, it would be difficult for the Lead Scientist to assume complete responsibility for bringing specific topics to the ISB. The reduced level of staffing indicates a need for a more activist board that can roll up their sleeves and assist in brainstorming and identification of issues.

Luoma noted that the Charge and the Draft Operating Guidelines are not set in stone, but rather can be modified to reflect the capacity, interest, perspective, and constraints of the ISB. Developing these operating guidelines will be a long-term process in which there is no specified deadline. The ISB agreed to re-visit the Draft Operating Guidelines and revisions to the Charge in three or four meetings in order to give the ISB additional work experience in terms of defining specific roles for the ISB, especially in relation to the other Science Boards.

First day session adjourned 5:00 p.m.

Meeting Summary, September 22, 2004

ISB Members in Attendance

Ken Cummins, Ph.D.	Jack Keller, Ph.D.	Denise Reed, Ph.D.
Tom Dunne, Ph.D.	John Melack, Ph.D.	Kenny Rose, Ph.D.
David Freyberg, Ph.D.	Judy Meyer, Ph.D.	Bob Twiss, Ph.D.
Bill Glaze, Ph.D.	Jeff Mount, Ph.D.	
Helen Ingram, Ph.D.	Duncan Patten, Ph.D.	

ISB Members Absent

Jeff Koseff, Ph.D.	Sam Luoma, Ph.D.

CBDA Staff

Dan Castleberry	Jana Machula	Rhonda Reed, Ph.D.
Lauren Hastings, Ph.D.	Johnnie Moore, Ph.D.	Kim Taylor, Ph.D.
Zach Hymanson	Tim Ramirez	Patrick Wright

Agency Staff

Roger Guinee (USFWS)	Diana Jacobs (DFG)	Diane Windham (NOAA Fisheries)
Campbell Ingram (EWP)	Dave Harlow (USFWS)	

Stakeholders

Gary Bobker (The Bay Institute)	Larry Smith (USGS)
Michelle Diaz (California Farm Bureau Federation)	Bernice Sullivan (Friant Water Users)

Consultants

Suzanne Gilmore	Diana Roberts
Kateri Harrison	Elizabeth Soderstrom, Ph.D.

Second day session convened, 8:35 a.m.

Welcome (Dunne)

Minor rescheduling of agenda items was agreed on:

1. Schedule 2005 meetings
2. Presentation and Discussion on Levees (Mount and Twiss) (1 hr 15 min)
3. Break
4. Water Management Science Board Update (Keller)
5. Subcommittee work sessions: 3 groups previous defined: DIP, EWA/ERP, Levees
6. Lunch break

7. Reconvene as full group; next steps for subcommittees
8. ISB feedback to Lead Scientist, particularly on yesterday's presentation, in response to his request for discussion
9. Public forum comments
10. Review action items and next steps for ISB
11. Briefing about tomorrow's field trip

Tentative meetings dates for ISB 2005 meetings (Dunne)

ISB members and Science Program staff discussed whether the full Board should meet three or four times a year. If three times per year, meetings could be three rather than two days, and subcommittees could accomplish work through additional meetings between formal full ISB meetings. The Science Program could provide public meeting and the subcommittee members could meet in person or via conference call.

More frequent meetings may be necessary to enable the Board to make decisions because of constraints placed on serial meetings (such as email or phone exchanges on a topic) by the Open Meeting Act. More frequent meetings, however, could result in a smaller percentage of members at each meeting.

Board members provided possible dates for the next meeting. Staff will send these dates to members for further input before a tentative 2005 schedule is drafted.

Presentation and Discussion on Levees (Mount and Twiss)

– *Subsidence, Seismicity, and Sea Level Rise: Impacts on the Delta, CBDA Programs and the Science Agenda*. Mount and Twiss. Presentation.

Twiss and Mount considered the potential effects of levee failure on a landscape scale, rather than on the scale of individual levees.

Since the 1880s, the Delta has lost more than 2 billion cubic meters of sediment through subsidence of islands in the Delta, caused by (1) microbial oxidation of organic matter (in a system that was previously anaerobic), (2) compaction, (3) de-watering, and (4) wind erosion and similar processes. Levees protect islands diminished by subsidence from inundation. The annual deposition in the Delta is 1.7 million cubic meters, far from enough to make up for the current loss. Further, the land in the Delta continues to subside, and if sea levels rise approximately 2–3 mm/yr, by 2050, there will be an additional 2.4 million cubic feet of water in the Delta.

Mount developed a *Delta Instability Index* (DII) based on *accommodation space*. Accommodation space is a measure of disequilibrium of Delta volume below mean sea level. The DII relates anthropogenic accommodation space (that area behind levees and below sea level not filled with soil or water) and subaqueous accommodation space. As the value of DII increases, instability increases. Based on past trends, the DII will increase, which will likely indicate increased instability in the Delta system. Single-island and multi-island levee failures are likely to increase because of stresses from accommodation space changes and sea level rise. An additional risk factor is 100-year storm events that typically cause flooding.

Seismicity is also a significant risk factor. The Delta lies above five major fault zones, including the Hayward and San Andreas. Magnitude 6 ground accelerations are likely. Levees have poor foundations and would be easily damaged. The entire Delta could be changed from a freshwater tidal marsh to a brackish lake in a matter of seconds in a significant seismic event.

Only one contractor rebuilds failed levees in the Delta. Currently there is capacity to rebuild only three levees in a year. Levees are armored on the outside but not on the inside, so if one fails, it erodes inside. If it is not repaired quickly, it might not be possible to repair it. If one levee fails, it increases the chances that other levees will fail.

The implications for the CALFED program are extensive. Water supply reliability, drinking water quality, and ecosystem restoration as currently implemented are dependent on the Delta system remaining as it is. However, this study suggests that it is unlikely that the Delta will remain in its current state—it is not a fixed system. How can CALFED respond?

Possible responses include the following.

- Develop risk assessment principles and methods for all program elements.
- Test the robustness of specific program plans against potential change. Prioritize ERP actions and milestones; check cross-dependence on water management actions (such as OCAP).
- Develop several "reasonably probable states of the Delta" for estimating future costs, benefits, and environmental impacts and benefits of programs. Feed these states into modeling efforts.

Discussion

This study does not have the resolution to determine which levees need the most care to prevent catastrophic levee failure. A "sacrifice" of a levee would not help the system because flooding in one place increases pressure throughout the system. The study did not consider the influence of upstream areas. The analysis is probably very conservative, and the risk is probably greater than portrayed.

Water Management Science Board Update (Keller)

– *Water Management Science Board (WM-SB): Some Cross-Program Element Issues/Questions*. Keller. Handout.
– *Memo from Jack Keller, Scott McCreary, and Eric Poncelet to Johnnie Moore, Lead Scientist, CALFED Science Program, regarding Nominations for the Water Management Science Board. Keller*. Handout.
– *WM-SB Nominee Biographies*. Keller. Handout.

Nominees for new WMSB have been identified. The handouts identify them and describe their qualifications. ISB members should review the list of candidates and indicate to the Lead Scientist their approval.

The WMSB will involve all Program elements.

Discussion

Not only rivers and the Delta but also the floodplains/riparian habitat are important and are not being addressed adequately now. Ecologists on this Board should help address the whole river system.

Other Board members, especially ERPSB members, might participate in task forces, panels, and subcommittees related to the WMSB to cover issues that require different skills.

Second day, morning session adjourned 10:30 a.m.

Subcommittees convened 10:30–12:00

DIP Subcommittee

DIP Subcommittee Convened 11:00 a.m.
Bay Delta Room, 5th Floor, 650 Capitol Mall, Sacramento.

Attendees

Denise Reed, Johnnie Moore, Kim Taylor, Zach Hymanson, David Freyburg, Judith Meyer, Bill Glaze, John Melack, Elizabeth Soderstrom.
Audience: Roger Fugii (USGS), Ron Ott (CBDA), Diana Jacobs (DFG).

Session Summary

After the last meeting, an ISB memorandum on DIP identifying three questions was submitted to the Authority. We should consider one aspect at a time, and water quality could be the first we address. By 2007, phase one is to have the planning component complete or the project implemented. The Authority is not directly responsible for water quality standards, but we can raise the level of awareness.

Reed suggested the following possible ways to move forward:

1. Recommend to the Authority additional exploration of monitoring operations and use of those data. Subcommittee can ask how new technology can improve monitoring techniques.
2. Consider a few data rich issues and ask how can CBDA learn from changes in operational functions. Issues could include the VAMP study or X2, as each have sufficient amounts of data. Possibly invite briefing speakers and/or hold work group fact finding sessions.

Subcommittee discussion included an overview of how to identify current modeling and monitoring approaches. Modeling efforts within the Delta system include CALSIM, Delta Simulation Models (DSM), 3D models (DCC 7 Harbor), as well as various efforts regarding VAMP, Hydro-dynamics, B2 and B3 models and the operation of barriers on Franks Tract. It will be useful to synthesize and compile all data sources in order to accurately evaluate what is needed for sound scientific recommendations.

During public comment CALFED staff and other stakeholders offered various suggestions including the CA Water Environmental Modeling Forum by SWRCB (Rich Soqouski), and historical water quality data from the Municipal Water Quality Investigation by DWR (Brian Bergamowski).

Action: Ron Ott to provide the subcommittee with a website describing monitoring in the Delta having some relation to IEP.

In general, a common theme of this discussion agreed that monitoring and modeling should be more closely connected.

On the subject of water quality, the point was raised that there is a significant focus on salinity when it comes to water quality. It was suggested that various other water quality parameters such as chlorides, nutrients, and metals such as selenium and mercury be considered.

Currently, the IEP is under review and their current timeline requests the scope to be finalized in November with a panel review in Feb/March 2005. A workshop will be held in late winter/early

spring 2005. Documents and reports produced during this review should be considered by this Subcommittee's monitoring fact finding team.

Action: Two fact finding teams; (1) monitoring and (2) modeling will begin by identifying what is currently being done is these two areas, initially focusing on the Bay Delta system. Each team will provide a brief update at the ISB's November meeting with a more substantial update to follow at the subsequent 2005 meeting.

EWA/ERP Integration Subcommittee

EWA/ERP Integration Subcommittee convened 11:00 a.m.

Sonoma East/West Room, 1st Floor, 650 Capitol Mall, Sacramento.

Attendees

Kenny Rose (Chair), Helen Ingram, Duncan Patten, Ken Cummins (subcommittee members). Tom Dunne, Dan Castleberry, Kateri Harrison, Diana Roberts.
Audience: Gary Bobker (TBI), Michelle Diaz (CFFB), Roger Guinee (USFWS), Campbell Ingram (EWP).

Session Summary

EWA has emergency water, and ERP needs water to restore river channels, wetlands, riparian habitats, wetlands, channel-forming flows, water velocities. More information is needed about existing coordination, ecological response to water, and the politics of buying and leasing water. Some coordination is happening, but this subcommittee wants to explore integration in the sense of joint decision-making rather than just coordination.

EWA adds its water to the system when it is needed, not planned or predicted in advance. It provides water supply reliability benefits. ERP presently can take the EWA contribution into account but cannot plan on its water on a large scale. EWA managers would be amenable to using water for restoration but it is unclear how it could be supplied as a long-term repetitive event.

To judge how EWA could benefit ERP, key measures of habitat and fish provided by ERP would be useful to EWA. EWA has gained a great deal of expertise and would like to transfer the knowledge. Modeling may lead to structural changes and efficiencies in decision-making.

While EWA enjoys a good reputation among farmers in general, currently there is litigation between the Farm Bureau and agencies over EWA (Michelle Diaz, California Farm Bureau Federation). If EWA water is used for ERP, there may be problems for using the water in other ways. Farmers are also uncomfortable with EWP (Bernice Sullivan, Friant Water Users Authority) because the PSP process defining water use under this program can be a 3–4 year process.

One way to integrate EWA and ERP is to create a portfolio of "tools" for water management, species protection, and restoration. EWP is one such tool.

Castleberry, Ingram and Guinee will provide this subcommittee with

- A table of available tools for water management, species protection, and restoration.

- A diagram and narrative (conceptual model) describing current coordination efforts among the two programs including weakness, barriers, and constraints to coordination, and suggestions for new tools to promote integration.

Lunch 12:00 p.m.

Full ISB Reconvened 12:50 p.m.

Report from DIP Subcommittee (D. Reed)
Modeling and monitoring should be integrated to provide information in a more timely manner. Existing models are difficult to change to fit current needs. Developing modeling tools to fit questions and types of answers needed by CALFED program elements might be more successful than trying to adapt existing models.

Many aspects of CALFED programs are not immediately amenable to models, for instance biological processes. A monitoring scheme can identify trends and data can feed into models for other purposes. It was proposed that there should be a monitoring initiative that considers what questions should be measured and at what level of science.

It would be useful to have fundamental biological information, such as genetic data at all trophic levels, which could be utilized for multiple purposes. Using modern programming techniques, it may be possible to link data assimilation with data distribution, data retrieval systems or GIS capability.

There was a suggestion to invite Antonio Baptista from the Columbia River Estuary to describe his experience with data assimilation to the next ISB meeting.

Two new standing teams will address the following issues:

- Monitoring (Glaze and Meyer)
  - IEP document
  - SP IEP review workshop
  - Investigate information assimilation
  - Presentation to ISB
- Modeling (Melack and possibly Koseff)
  - CALSIM review
  - Develop future agenda item to report on California Environmental Water Model Forum
  - Presentation to ISB, possibly including work on the Columbia River

Report from EWA/ERP Subcommittee (Rose)
Rose summarized the results of the Subcommittee meeting and indicated that next steps are for CBDA staff (Castleberry, Guinee, and Ingram) to document the portfolio of "tools" for water management, species protection, and restoration and to document existing coordination efforts among the two programs.

Public comment noted that although more information is needed from EWA, ERP, and EWP managers, it was also clear that integration is already being attempted and they need guidance with conceptual models, management of assets, and decision-making. The Science Program should anticipate needing to respond, and the ISB might be involved.

Roger Guinee said that water managers could be more responsive if they could get a clear message from CALFED about what is envisioned in terms of EWA/ERP integration.

The EWA/ERP Subcommittee will give further consideration to integration issues during the November 10 work session and provide a briefing to the ISB at the next meeting.

Report from Levees Team (Mount)

Mount plans to present a paper at the CALFED Science Conference focusing on the science aspects of the September 21 ISB presentation. He has also been invited by the Authority to speak about the material. He would speak as an individual rather than representative of ISB.

He challenges the assumption of the CALFED ROD that the Delta should be maintained in its current state. The Delta is a system in constant change. In the long-term, the Delta may not be usable for conveyance and if brackish water intrudes into the Delta, a new canal to send fresh water to the southern part of the state may become necessary.

Discussion

Any presentation on this topic should include a discussion of implications, with perspectives on how to address adverse impacts of likely change (for instance, through a proposal for a research agenda to address critical unknowns). In particular, in response to the presentation's main point, the implication is the necessity to re-think programs that are predicated on a static Delta system, to suggest how they may be re-thought, and suggest research to accomplish this.

Whether this document is an ISB product or the product of an individual was discussed in great detail. Mount developed the analysis and index alone, though in response to a request for information on prospects for levee integrity. The scope and level of detail of Mount's work went beyond the ISB's original charge. On the other hand, it is intimately tied with ISB direction, recommendations, and reputation. A more formal process for ISB-related research is necessary in the future to avoid any possible misunderstandings of who is responsible for the work—the individual or the Board. If the ISB is responsible, a standard process for peer review should be followed. If a Board member does work based on ISB ideas, the work should in the future remain a Board product if CALFED funding is accepted. The product requested by a CALFED entity should also be clearly delineated; for instance, in this case, the ISB and Science Program asked for a report, whereas Mount developed a presentation and drafted a paper larger than the scope of the requested report. To resolve this question, the ISB voted to release the levee analysis to Mount as his intellectual property, with the understanding that this vote applies only to the current circumstance, and with the understanding that support be acknowledged. The ISB intends to use the information for a future report on implications. (Freyberg and Mount abstained. Glaze and Reed voted no. All other ISB members present voted yes.)

It was suggested that formal ISB documents be reviewed by the ISB, be peer reviewed, and then receive formal approval by the ISB. Moore will also inform ISB members what process to follow for ISB member review and comment on draft technical documents (such as Mount's levee manuscript) in conformance with requirements of the Open Meeting Act.

It was recommended that for this topic (and possibly for future topics for which this is a precedent), the ISB should address policy implications only after it has discussed science implications. An alternative viewpoint asked whether the ISB should discuss policy implications at all.

Public Forum Comments

Public forum comments were taken one agenda item earlier than planned because only one audience member requested to speak.

Fred Lee, Ph.D., DEE gave a brief presentation on Sacramento-San Joaquin River Delta water quality issues, based on his work and that of Anne Jones-Lee, Ph.D. He outlined many causes for impairments to water quality (see presentation for discussion). These include pesticides and "legacy" pesticides, mercury, low dissolved oxygen, heavy metals, nutrient levels, pathogens, salt/EC in South Delta channels, sediment accumulation, total organic carbon, excessive selenium, exports of Delta water to San Francisco Bay Region and Central and Southern California, inadequate water quality monitoring, and CALFED funding issues.

Lee recommends that an expert panel be appointed to define data gaps, develop a comprehensive water quality monitoring and evaluation program, oversee and review monitoring results, recommend additional studies, and work with Regional Water Quality Control Boards. Further, a multi-million-dollar per year monitoring and evaluation program funded in perpetuity is needed to evaluate and manage Delta water quality.

ISB Feedback to Lead Scientist

Performance Measures

Moore asked for input and guidance on performance measures. Evaluation of success of a project or program is based on three points: (1) whether it was funded (and details), (2) whether it was implemented (and details), and (3) how it performed ("validation monitoring"). This last emphasizes impacts.

Discussion

Performance measures for system response are complex and are often assessed on the project level. The vetting procedure to be performed by DRERIP can help reveal what information is needed. Data rating (whether the data is available) is a factor in moving from list-based performance measure (level 2) to science-based performance measures (level 3). It is essential to determine the length of time to collect data so that significance beyond natural variation can be determined. This could be a matter of a few decades. Jim Cowan of EWA could provide guidance or advice. Monitoring is essential to measuring performance.

Response to Legislative Trailer Bill

The Science Program intends to draft a plan to respond to the Legislative trailer bill's question on water for fish by the January 10th deadline. The plan may propose an approach similar to the Mercury Strategy, which could include a steering committee to identify workshop topics, track work on existing panels, and develop the strategy as a proposal for the Science Program. The response document (Plan) could serve as a working document reviewed and updated every six months.

Rose and Cummins will help draft the response, to be reviewed by the ISB during the November meeting.

Discussion

Developing and implementing a research agenda on this issue will take place over many years, so the response to the Legislature must assume that the Delta is not static. The response should recognize impending change and the uncertainty around that change. A key to the success of the

Mercury Strategy was the three outside specialists who were deeply invested. This new strategy should appoint people with good connections.

The question posed by the trailer bill is expressed problematically; the consideration should not be how much water is needed, but rather what regime of water is needed, and for what goals. Water for capacity versus water for process and water quality are also relevant.

A new Subcommittee could be instituted to deal with long-term questions such as this and also a strategic plan for the Science Program.

New ISB Member Appointments

Moore is ready to appoint a representative of two disciplines: Environmental or Resource Economics and Risk or Decision Analysis.

Other disciplines are also needed on the ISB, with possible trade-offs in effectiveness if the Board becomes too large (up to 25 members). The Authority has agreed to all disciplines proposed except the position of an attorney, but urged representation for agriculture (possibly resource economics for agriculture). Moore asked ISB members to consider these suggestions from the Authority.

Moore will make appointments with non-binding advice from ISB members.

Discussion

Moore should request recommendations for individuals in these two disciplines directly from select ISB members.

The risk management person should understand risk in broad systems and have experience in more than one area. If a specialist is necessary, the specialty should be ecological risk assessment. Scientific and engineering risk assessment is more mature than risk assessment involving policy-making and is more appropriate to CALFED's needs. The appointee must understand the implications of language use; language used in different subfields of risk assessment is different enough that cross-communication could be difficult.

The other disciplines should be chosen with the Legislative trailer bill question in mind. What disciplines are necessary to respond to its mandate? Current recommendations include environmental law, resource economics, risk/decision analysis, social geographer, innovation and change, management science.

An individual can reasonably serve on one or two Boards and it is desirable for ISB members to serve on one other Board. The new Water Management Science Board will have a quarter of its members serving on two other Boards. This is useful for the start-up phase so that the WMSB becomes effective more quickly, but it should not be a long-standing situation.

Day 2 session adjourned 4:50 p.m.

Fieldtrip, Thursday, September 23, 2004, 8:30 a.m.–5:15 p.m.

Field Trip attendees convened 8:40 a.m.
Rio Vista City Hall Chambers Room

Attendees

Roger Fujji (USGS), Terry Macaula (DHS), Miranda Fram, John Burau (USGS), Brian Bergam, Gita Kapahi (SWRCB), Karen Schwinn (EPA), Lenny Grimaldo (USGS), Steve Ford (DWR), Lisa Holm (CALFED), Tom Gohring (CALFED), Tom Dunne (ISB), John Melack (ISB) Judith Meyer(ISB), Bill Glaze(ISB), Kennith Rose(ISB), Ken Cummins(ISB), Kim Taylor (CALFED), Elizabeth Soderstrom (NHI), Suzanne Gilmore (Kleinschmidt)

Session Summary

John Burau: Bay Delta Introduction

- Overview of: tidal dispersion, water quality parameters, Delta outflow sites, flow measuring devices, timeframe of data collection, monitoring of chlorophyll, 30 monitoring station locations.
- Modeling components
- Dynamic Conceptual Model: The Delta as a River
    - Delta tidal changes
    - Suisun Bay tidal currents
    - Shear flow dispersion
- Tidal excursions
    - Distance a current will go over the tide; Fish move large distances with the tides
    - Tidal excursions are large
- Monitoring of water quality
    - If collecting salinity, should do it continuously
    - Only IEP, MWQI, water operations doing long-term monitoring of water quality
- Super Stations
    - Flow station network
    - IEP Review has plans for strategic station locations
    - Currently long term monitoring is through the IEP & Municipal testing
    - The idea is to co-locate the measurement of many constituents

Boat Tour South Delta from Rio Vista: 9:40 a.m. to 12:25 p.m.
During the boat tour, issues discussed included the scale of restoration efforts and the various roles of the Delta, from water delivery to flood protection, canal system, and habitat.

Ryde Hotel 12:50 – 2:30 Lunch Presentations

Lenny Grimaldo: Origins of Food Web Theory

- Tidal Marsh Ecology
    - Food productivity
- Estuarine Food webs
- Restoration opportunities
- Problems with Initial Conceptual Model
- Breach studies
- 100s of years for sub-tidal elevation – inter-tidal elevation
- Lessening of fishes in flooded islands

- Results of near-shore, offshore food web studies

Miranda Fram: Why DOC is Important

- Drinking water quality
- DOC & DBP formation; DBP Mitigation
- DOC origins
    - Soil organic matter
    - Plants, animals, humans
    - Algae and bacteria
    - Sweetwater Reservoir Case Study

Brian Bergamaschi: Photo oxidation & Photo exposure

- DOC Concentration
- DOC Quality. DOC quality is as important as quantity
- Both will vary significantly
- Average SUVA values
- STHMFP
    - Sacramento River
    - Island dam
    - Pumps
- Where does DOC come from?
    - Peat Islands
    - Tidal wetlands
    - How much DOC is added in the Delta, what will be the effects of large-scale wetland restoration on DOC? Only 25% of DOC coming from the Delta, the rest is coming from upstream—need to address changes upstream.
- Clifton Court chemical composition
- Preliminary estimates
    - Tidal wetlands
    - Agricultural operations on peat soils
    - Non-tidal wetlands

Erwin Van Neuwinhouse: IEP/EMP Review

- 12 agencies involved
    - 7 federal/5 state
    - IEP focus is on the Delta, whereas CALFED focus is broader
    - EMP Review is a 2-3 year consultation
- IEP: Ecological Variables
    - Phytoplankton, zooplankton, benthos, water quality
    - 2000 Review Process
    - Monitoring/Modeling Integration

John Burau: Tendencies of fish with relation to the Delta Cross Channel Gates

- Fish data and flow velocity
- Radio tagged fish results

Boat Tour Central Delta (Georgiana Slough, Delta Cross Channel Gates): 3:45 p.m. to 5:15 p.m.

Field trip adjourn 5:15 p.m.