Table 8. Partial compilation of EWA Review Panel comments including observations, recommendations, and action items and some responses. More weight should be given to the 2001-2002, 2002-2003 reviews because the panel members were still becoming familiar with the EWA and Bay-Delta system during the first review (2000-2001).

Review Panel Recommendations	Response
2000-2001 Review	
Observation [1]: No formal mechanism in the EWA to act on, or respond to, critical findings noted by the Science Advisors	
Observation: Absence of Tier 3 funding	Tier 3 protocol and funding established in 2002
Observation: Need to establish the rigor and strength of the scientific foundation from which EWA decisions and actions are being implemented.	
Recommendation [2] 1: Release sufficient agency staff time to support the development of the EWA, and to put as high priority CALFED projects that address EWA needs (no new funds but rescheduling of staff time)	Agency time was released to develop the EWA but EWA-related projects were not prioritized (Z. Hymanson, written communication, 2004)
Recommendation 2: In support of EWA-related research, CALFED should recruit and support as appropriate: visiting senior scientists, post-doctoral and graduate students, targeted contracting, and requests for proposals for research outlined in a science workshop. New hires must work in close collaboration with the existing staff members of agenicies comprising the EWA, as well as the new water market specialists described in a later action item	Neither CALFED or other agencies have done this. CUWA (California Urban Water Agencies) has funded consultants to develop a winter-run life cycle model and academic research into estimating population size of the delta smelt population (Z. Hymanson, written communication, 2004)
Recommendation 3: Synthesize in a quantitative manner and a readily accessible location all available data on salmonid species of concern. This databank should include information on life history and the effects of Delta habitat conditions and hydrodynamics on threatened species of salmonids.	White et al. (2002) note that the technology for such a databank exists but requires a commitment from a wide array of scientists to store data in a compatible manner. They suggest starting with an index of pertinent articles/reports and data sources but note even this will require additional resources (personnel and money). All EWA documents have been posted to the CALFED web page.
Recommendation 4: Establish a research thrust to fill fundamental gaps in knowledge of the biology of delta smelt	White et al. (2002) point to EWA and other delta smelt workshops to establish the research agenda. IEP developed a research agenda but it was not reviewed or implemented (Z. Hymanson, written communication, 2004)
Action Item [2] 1: Evaluate the existing sampling and monitoring efforts to determine if additions or modifications would provide improved data on the target species. The planned analysis and evaluation of current JPE (juvenile production estimate) estimation techniques is a very good place to begin. In addition, we recommend that new research topics should be identified and prioritized in a CALFED sponsored workshop to describe current understanding and additional research needs.	Revision of the JPE was accomplished (White et al., 2002).
Action Item 2: Further analyze the monitoring and field data using statistical and simulation modeling techniques that explicitly include uncertainty and stochasticity	White et al. (2002) note that lack of staff-time and in-house expertise limit the ability to conduct probabilistic analyses. White et al. (2003) calculated confidence limits for a number of data provided by

	monitoring programs. Several models were also evaluated to determine uncertainties.
Action Item 3: Obtain better estimates of growth and mortality rates in the Delta and presalvage mortality rates in the Clifton Court Forebay.	White et al. (2002) agree these are important but offer no specific actions.
Action Item 4: The panel recommends that a scientifically-based risk analysis, using synthetically generated scenarios eased on historical data analysis, be used to estimate the water supply reliability afforded by the EWA over the long term and to identify Tier 3 asset size and protocol for its use. The explicit analysis of hydrologic, climatic, and biological variability required for such an analysis will significantly enhance understanding of the Delta system.	White et al. (2002) note that several outside groups have conducted some modelling exercises but the applicability of the model has not been evaluated. EWA needs additional expertise to conduct such risk analyses.
Action Item 5: The management agencies should actively identify, evaluate and pursue if appropriate, opportunities to use EWA water (5% to 15%) for scientific experimentation likely to generate information that will guide future management decisions. Experiments should be based upon the research priorities identified in the CALFED science workshop.	White et al. (2002) notes that this amount of water is not sufficient to conduct meaningful experiments and suggest that it might be appropriate with other users with similar interests so risks are shared. To date EWA has not used water for experimental puposes unless there was a concurrent protective function.
Action Item 6: Quantify the losses of delta smelt larvae at the pumping facilities.	White et al. (2002) suggest that delta smelt experts be consulted on how this could be done and how the information could be used.
Action Item 7: Investigate how knowledge of salmon and smelt behavior could be incorporated into physical transport models of the Delta. Further strengthening of the fisheries-physics link may be crucial to addressing the specific entrainment problem.	Luoma (2003) notes that data is being collected as part of several programs that will support development of a fish tracking model. A workshop is being organized to explore a specific suggestion by the panel to use PIT (passive internal transponder) technology in the development of a fish tracking system. White et al. (2003) present several evaluations of factors associated with chinook salmon migration. Luoma (2003) notes 3 fortuitous modeling efforts that will be addressing entrainment issues, including the zone of influence, hydrologic particle transport, and indentification of source waters at various points in the Delta.
Action Item 8: The management agencies should consider using formalized, probabalistic decision-making trees or other criteria that better incorporate changing conditions and uncertainty.	
Action Item 9: Analyze the data used in the gaming with the specific goal of improving the decision trees used to guide EWA actions. Extend the range of variability considered in refining and testing the decision trees by incorporating as much of the historical record as possible and by developing synthetic stochastic time series data based on the historic record.	
Recommendation 5: The management and project agencies should evaluate existing constraints on EWA flexibility.	White et al. (2002) presents several strategies used to increase EWA flexibility.
Recommendation 6: Provide the EWA with resources and information needed to use flexibility effectively.	
Recommendation 7: Improve the ways in which agencies are currently using the	

flexibility that the EWA provides.	
Action Item 10: Management and project agencies should continue to work to identify rules of operation that limit EWA operations and to evaluate the extent to which those rules can and should be modified to increase adaptive management and experimentation.	
Action Item 11: As new biological, hydrological, and economic information becomes available, CALFED should reexamine the amount of water, and the equivalent funding that the the EWA needs. Additional water and funding will be needed if and when water projects are expanded.	
Action Item 12: CALFED should clearly articulate the basis for its allocation of water between Tier 2 and Tier 3. In light of what is now known about EWA implementation, CALFED should determine whether the existing allocation of Tier 2 and Tier 3 water best serves EWA objectives.	
Action Item 13: At least two additional experts should be added to the permanent staff of the EWA: an expert in water markets and portfolio management who can help in the acquisition and administration of the EWA's water assets, and an expert in project operations who can provide advice on operational options and ensure that EWA is properly accounted for. Both experts should be assigned directly to the EWA.	White et al. (2002) identify agency hiring and funding limitations as roadblocks to hiring such experts.
Action Item 14: CALFED should target a research effort that is likely to produce information that will support and increase management flexibility.	
Action Item 15: The Panel suggests that the management agencies should make a more systematic effort at reviewing their management of EWA water in light of each year's experience.	
2001-2002 Review	
Recommendation "suggestion" 1: CALFED Science Program leadership should search for an institutional mechanism to enhance communication among all programs designed to manage living resources, leading to a strategic plan in which all actions (including habitat creation, flow manipulation, barrier emplacements, gate operations, and new pumping regulations) are considered in an integrative approach to living-resource management.	Luoma (2003): A CALFED Science Program strategic plan toward integration remains implicit and opportunistic. First, establish dialogue about integration through CALFED Science Conference, EWA workshops, other workshops, participation in IEP, support for Bay-Delta Science Consortium small science projects, and support for 3 NOAA fisheries scientists to develop the Central Valley salmonid recovery plan. Second, work toward integration within regions. Examples include coordination of EWA with the Environmental Water Program (ERP) and discussions of Integrated Key Milestones. Third, begin specific experiments that encourage integrated views of actions or management.
Recommendation 2: Clearly state the criteria and underlying information used to develop the decision tree so that their basis can be evaluated.	White et al. (2003) annotates the salmonid decision tree to better establish the basis for decisions. The new DSRAM for delta smelt is much better documented than the original decision tree.
Recommendation 3: Define the measures that will be used to evaluate the biological performance of EWA actions.	Luoma (2003) notes the difficulty of defining such measures here and elsewhere around the world. However, some progress has been

	made. A consultant, CALFED staff, and agency staff have developed seven measures of CALFED performance that include EWA as an influence. EWA biologists drafted a report. "Goals, Objectives, and Measures of Success of EWA" for salmon (see White et al. (2003) for details). White et al. (2003) estimate numbers of fish saved and the proportion of the outmigrating population thse fish represent.
Observation: CALFED must insure that all federal and state environmental water programs, including the EWA, work as an integrated unit in meeting environmental needs.	
Observation: EWA should continue to look for opportunities to achieve multiple goals through single management actions.	
Observation: EWA must work to further expand the market for its acquisitions and sales, to look for new forms of water transactions that can stretch its limited budget, and to use forecasts and modeling tools to ensure that funding is used efficiently.	DWR has done some of this (Z. Hymanson, written communication, 2004)
Recommendation 4: CALFED should support targeted post-docs, university faculty, or other distinguished scientists to work on specific problems central to EWA. These critical research activities will have the best chance for success if they significantly incorporate the efforts of scientists and engineers outside the MAs and PAs.	Two million dollar joint program with Sea Grant to fund teams involving post-docs or graduate students, university faculty, and agency mentors to work on issues relevant to the watershed. CALFED Science 2003 (now 2004) RFP to award 10 to 20 million dollars for interdisciplinary studies to address critical issues to EWA and other CALFED programs.
Science challenge 1: Determine the combinations of physical conditions in the Delta (flow, transports, temperature) that give rise to "entrainment events" of delta smelt.	Luoma (2003) notes 3 fortuitous modeling efforts that will be addressing entrainment issues, including the zone of influence, hydrologic particle transport, and indentification of source waters at various points in the Delta. A draft of the delta smelt whitepaper was completed. Brown and Dege (2004) published a paper analyzing existing data on the distribution of young delta smelt in response to outflow conditions. A 2003 EWA workshop exploring modeling strategies for delta smelt was organized (and conducted). Hymanson et al. (this workshop) analysis of salvage data and environmental variables.
Science challenge 2: Determine the growth and mortality rates, habitat use, and movement patterns of juvenile chinook salmon within the Delta.	Luoma (2003) notes that the salmonid white paper is being completed and will summarize much of the existing data. Data is being collected as part of several programs that will support development of a fish tracking model. A workshop is being organized to explore a specific suggestion by the panel to use PIT (passive internal transponder) technology in the development of a fish tracking system. White et al. (2003) present several evaluations of factors associated with chinook salmon migration.
Science challenge 3: Develop a quantitative synthesis of the life cycle of delta smelt and	A delta smelt modeling workshop was held and a group formed to

chinook salmon.	take the next steps in model development. The California Urban Water Agencies (CUWA) have contracted a consultant to develop winter-run chinook salmon life cycle models. CUWA has funded a university researcher to estimate population size of delta smelt. Numerous activities are underway that provide data useful to the development of such models.
Science challenge 4: Determine the magnitude of predation mortality in Clifton Court Forebay, including elucidation of whether losses through the forebay differ by species and vary as a function of prey density.	A 2-day workshop was planned (April, 2004) (Luoma 2003) but did not occur (Z. Hymanson, written communication, 2004). White et al. (2003) provided the results of 8 previous studies that estimated prescreen mortality of hatchery-reared juvenile chinook salmon at 63-99%.
Science challenge 5: Determine how to optimize Delta Cross Channel operations with regard to EWA.	Luoma (2003) identified the Delta Cross Channel studies as providing a basis for addressing this challenge.
Science challenge 6: Determine reservoir management strategies to improve the availability of cold water for in-stream habitat enhancement with regard to EWA operations.	Luoma (2003) indicates that this challenge is likely limited to the American River with regard to EWA and mentions CALFED support to the Water Forum, which is leading efforts to improve fisheries, instream flow and temperature management. White et al. (2003) provide a detailed analysis of the effects of the EWA actions on the American River.
2002-2003 Review	
Recommendations and topics of concern made during the two previous reviews remain highly relevant.	See above for responses to earlier recommendations. Responses to the 2002-2003 recommendations are expected as part of the reports sent to the review panel in preparation for the 2003-2004 review.
Long-term challenge 1: Determine how to manage long-term opportunities and risks in the context of a continued, long-term EWA.	
Long-term challenge 1: Determine how to meet demands for increased accountability.	
Recommendation 1: Continue the annual science reviews. The reviews stimulate cooperation among stakeholders, forces documerntation, and enhances scientific value of the work used in the EWA decision-making process. Peer-reviewed publications are highly desireable.	Annual reviews have continued.
Recommendation 2a: The EWA agencies should formally review and summarize the accomplishments and lessons learned from the current four-year experiment to document the successes, limitations, and concerns regarding the EWA and to provide a sound basis as EWA looks toward the future of the environmental use of water.	This is the focus of the 2004 review.
Recommendation 2b: Conduct a program-wide review of EWA and EWA-related (CALFED wide) activities every 4 to 5 years, including other science-based elements of CALFED.	
Recommendation 3: Conduct a more self-conscious integration of the EWA with other programs and tools for environmental restoration.	FWS is currently working on this (Z. Hymanson, written communication, 2004).

Recommendation 4: Conduct a more effective incorporation of science into policy and regulatory measures that form the context for EWA implementation.	
Recommendation 5: Increase the mobilization of resources to address critical science needs, Recommended mechanisms other than agency hires include: 1) alliances with academic institutions and other outside experts to provide specific expertise to resolve bottlenecks in data analysis and synthesis; 2) more creativity and networking among existing regional expertise within state and federal agencies; and 3) initiatives to fund and quickly mobilize human resources, such as students and post-docs, to work on critical science needs.	Two million dollar joint program with Sea Grant to fund teams involving post-docs or graduate students, university faculty, and agency mentors to work on issues relevant to the watershed. CALFED Science 2003 (now 2004) RFP to award 10 to 20 million dollars for interdisciplinary studies to address critical issues to EWA and other CALFED programs.

[1] "Observations" were not explicitly identified in the report but were points made in the text that seemed particularly important.

[2] The report did not provide definitions of "recommendation" and "action item", so the difference is unclear.