

**Review of the 2002-03  
Environmental Water Account (EWA)**

**Submitted by the 2003 EWA Review Panel**

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**Introduction**

The third annual meeting to review the Environmental Water Account (EWA) convened on October 15–17, 2003 at the Grand Plaza Grand Ballroom in Sacramento, California. The EWA Technical Review Panel (Panel), under its continued charge from CalFed’s Lead Scientist, was again assembled “..... to provide a balanced and constructive evaluation of EWA implementation in 2003, with the goal of making recommendations for future implementation.” The eleven members of the 2003 review Panel are listed in Appendix 2.

This report provides the review Panel’s evaluation of the third year of the EWA and offers conclusions and recommendations concerning the effectiveness of EWA operations and how the science in support of EWA decisions and operations might be improved. Written documents that described the third (2002-2003) year’s activities were distributed and reviewed by the Panel prior to the annual review. At the annual review meeting, oral presentations by both management and agency participants and stakeholders provided important additional information that supplemented the written documents. Following the public presentations and discussions, the Panel met to discuss and evaluate the 2003 EWA operations and to evaluate the progress made in implementing previous Panel recommendations. The Panel drafted a preliminary set of findings and recommendations that serve as the basis for this report, and presented them to the meeting participants and the public on Friday October 17, 2003. An exchange of comments and questions from the public, stakeholders, and agency personnel followed the Panel’s presentation.

In the 2001-2002 EWA review, the bulk of the Panel’s report focused specifically on how to address some of the science challenges facing the EWA agencies. Last year’s review devoted considerable attention (in the written report) to how those science challenges could be addressed. The 2001-2002 recommendations also included specific strategies that might be used to mobilize the human resources and expertise needed to address some of the science challenges facing EWA agencies. The Panel offered specific recommendations and suggested potential mechanisms to begin to address those science challenges in a climate that the Panel recognizes as unfavorable to adding new state personnel or initiatives. This year, after three years of EWA operation, this

report focuses more specifically on some of the immediate challenges and concerns facing the EWA agencies if EWA is to continue beyond the current four-year experiment.

The Panel cautions readers of the 2003 report to be aware that many of the recommendations and topics of concern made in the previous two Panel review reports remain highly relevant to EWA operations in 2003 and beyond. Previous recommendations will continue to require attention. For the most part, previous recommendations will not be repeated here unless specifically relevant to this year's recommendations. For example, the Panel recognizes that significant progress on the science challenges described in last year's report is a long-term process and that progress will be modest and incremental in any one year. The Panel chose to restate and expound upon two areas of concern noted in earlier reports because we believe they are critical to the evolution of the science driving ecological water operations, and therefore to long-term future success of EWA, and we have been disappointed and perplexed by the limited progress to date. Those two areas of special concern are: 1) increased evaluation and integration of EWA with other programs and tools, and 2) mechanisms and actions to address the critical science needs of EWA.

The Panel recognizes that the EWA is poised for final evaluation as an effective tool for long-term ecological water management, and that proposals to establish the EWA as a permanent program have already been floated. We have framed this year's report with that in mind. The report is organized as follows. We first present a number of positive findings. We then discuss two new challenges the EWA is likely to face if it transitions into a long-term program: the need to manage long-term risk and demands for increased accountability. These two factors are important because they change the frame of reference for EWA operations and the evaluation of EWA performance. With these two factors as a backdrop, we then identify 5 major recommendations that relate to EWA operations, both currently and should the experiment be extended into a long-term program.

### **Positive Findings for EWA 2003**

The third year of the Environmental Water Account (EWA) demonstrated continuing improvement and progress in a number of areas. Several of the more noteworthy are highlighted below. As has been the case in each of the past three years, the Bay-Delta Authority, agency staff and others produced a substantial written record for review by the Panel prior to its annual meeting. Without this documentation, a thorough programmatic and scientific review would not have been possible.

- The process of acquiring water for the EWA continues to be one of the most effective elements of the program. The Panel was favorably impressed with this year's efforts to diversify resources in a creative manner and to develop models of acquisition, storage, and debt. The effort to model water use pre- and post-EWA in order to gauge effectiveness was insightful and is the kind of analysis the Panel thinks is needed for other dimensions of the program. The EWA water acquisition team is continuing to address potential conflicts between traditional water users and the EWA. The issue of the price paid for water by the EWA is particularly challenging. One unanticipated effect of the EWA's water acquisition program has been that it is helping to develop the water market in California and also developing various approaches that other water users are finding useful and adopting.
- In a more general sense, evidence continues to build of increasing cooperation and competence in conducting complex, multi-disciplinary studies and experiments on subjects such as the Delta Cross Channel, VAMP, and Clifton Court Forebay. Such work has combined the efforts of multiple agencies, researchers, and stakeholders. It should directly lead to improvements in management by increasing our knowledge base. In addition, the Panel notes that successful collaborative efforts also have clear, but difficult to quantify, positive effects on management activities well beyond the stated scope of EWA.
- The EWA symposia and workshops conducted by the Science Program in 2003 were a particular highlight of the year. These included the Science Symposium on Environmental and Ecological Effects of Proposed Long-term Water Project Operations, the 2003 EWA Chinook Salmon Workshop, and the EWA Delta Smelt Workshop, in addition to workshops on salmon escapement, mercury, and fish screens. Of particular note, the accelerating efforts to develop, refine and apply conceptual and mathematical models to Bay-Delta fishery problems have high potential benefit.
- It is clear that past recommendations by the Panel have been given serious consideration. The continued evaluation and use of decision trees, the initial development of performance measures, and the refinement of scientific tools are specific examples of these efforts. We look forward (next year) to the actual application of the various performance measures being proposed and developed. For example, the increased consideration of how to use EWA water upstream (e.g., American River) versus the Delta is a direct response to one of the Panel's prior science challenges. Moreover, the upcoming request for proposals (PSP) is

expected to specifically address other science challenges that the Panel has raised in previous review reports.

- Finally, through a combination of favorable natural system features and allocation of EWA (and other) water, fish crises in the Delta were avoided during the past year. We commend the efforts of the EWA team, particularly given the tight budget and personnel challenges they faced during the past year.

## **Long-term Opportunities and Risks and Increased Accountability: Two New Challenges If the EWA is Extended**

### **Challenge 1: The Need to Manage Long-Term Opportunities and Risk**

The anticipated change in the EWA from a 4-year experiment to a long-term program will impact the nature of the scientific and technical tasks facing the implementing agencies. As explained below, a long-term EWA will create both new opportunities and new risks in managing the EWA's assets. To take full advantage of these opportunities and to reduce the risks, the implementing agencies will need to develop new, more sophisticated tools and take greater advantage of the tools that already exist.

On the opportunity side of the ledger, a long-term EWA will provide implementing agencies with greater flexibility in the acquisition and use of water resources. To date, the EWA has had to purchase water primarily on a year-to-year basis. Although the California Department of Water Resources (DWR) has done a good job over the past several years in trying to diversify its acquisition strategy and minimize the cost of its water purchases, the EWA's short time horizon inevitably has limited purchase options. An increased time horizon offers new water supply alternatives. One example is the proposed matching of dry-year and wet-year water options. Because consumptive water users are most worried about firm sources of water in dry years while models predict that the EWA will need the most water in wet years, DWR can acquire wet-year options (or "put" dry-year options) at an attractive price. Such options, however, only work over the long-run when there will be a string of wet and dry years.

A longer time horizon not only will open up new acquisition options for the EWA, but also will expand the size of the water market for the EWA and hopefully enable DWR to acquire a secure supply of water at lower prices. While many water users are interested in short-term

trades, other water users wish to engage in longer-term transfers that can provide greater price security for the buyers while reducing their transaction costs. To the extent that prices are not higher, the EWA also has an interest in reducing its own transaction costs by locking up a longer-term portfolio of water. A long-term EWA will permit DWR to investigate these options and use them, hopefully to provide a more secure supply of water at lower cost.

A longer time horizon also will give the implementing agencies greater flexibility in their use of the EWA's water resources. One of the goals of the EWA has been to permit the management agencies to use the EWA's water assets when the agencies believe that the water will most benefit at-risk fish species. Rather than facing a largely fixed flow regime, the EWA allows the management agencies to vary the flow to meet the environmental demands. To date, however, the EWA has provided only intra-year flexibility. The management agencies, for example, have been able to choose to save water in January for use in the spring, but the agencies have enjoyed only limited capacity to save water in one year for potential use in future years. If adequate storage is available, a long-term EWA will provide the EWA with not only intra-year but inter-year flexibility, enabling the agencies to choose to preserve assets in some years for other years in which greater environmental water needs arise.

Finally, the shift from short-term experiment to a long-term program will allow the government to reexamine the regulations and infrastructure within which the EWA operates and to ensure that the EWA's potential benefits are maximized. The Panel understands that both the biological opinions that form the main regulatory framework for the EWA and the water quality standards for the Bay-Delta are currently being revised. As discussed later in this report, a long-term EWA opens up the opportunity to create more adaptive regulatory standards that use the EWA as a source of information and experience. In the long run, the EWA and applicable standards could work in tandem so that the regulatory requirements reflect the learning gained through the EWA and more broadly through the CalFed Science Program. The government, moreover, can and should use the shift in the EWA's time horizon to reconsider how the EWA is funded. To date, the EWA has been funded largely through short-term appropriations and current bond funding. A long-term EWA, however, opens up the option for longer-term sources of financing such as water fees.

With greater opportunities, however, go greater risks. In a long-term framework, for example, the management agencies will need to manage their water resources more carefully. During the EWA's experimental period, the management agencies faced the risk that using the EWA resources too early in the year might leave the EWA without water later in the year when

an unanticipated water need arose. But the EWA did not face inter-year risks; each year, the government replenished the EWA's coffers, permitting it to purchase a new portfolio of water. In a long-term EWA, the agencies will also face trade-offs between the use of resources in current years and the desire to build up a reserve for future years. The management agencies thus must improve their ability to predict future needs, and develop tools to balance current demands and potential future requirements. The management agencies, moreover, may feel pressure to act in an excessively conservative fashion in early years, using water even when its biological value is relatively small, in the expectation that they will be able to balance out the EWA's water account in future years. Although such a strategy would reduce the risk of an environmental error in the early years, it would run a significant risk of long-term failure. Alternatively, the management agencies might feel pressure to "hoard" water resources in early years so that they do not run out in future years, placing the environment at greater risk.

Under a long-term EWA, the management agencies also will face greater planning risks in acquiring water resources. They will need to try to anticipate the EWA's water needs on an inter-year basis, ensuring that water is available when and where needed. In purchasing water, moreover, the management agencies will need to evaluate the most appropriate mix of various types and lengths of water acquisitions. Longer term contracts, for example, might cost less but could also lock the EWA into price levels at the time of the contract. That could be either a good or bad thing, depending upon how good EWA managers become at anticipating future market changes.

A long-term EWA may also pose greater risks to third parties. Economic research on the impact of water markets on agricultural economies, for example, suggest that short-term transfers generally have smaller impacts on local economies than longer-term transfers. Effective management of EWA assets in the long term, moreover, may require the EWA to engage in more water storage operations, which also could have third-party impacts on other water users. The management agencies can avoid and mitigate such potential impacts, but only through careful evaluation of the potential impacts and through cautious structuring of its transactions.

A long-term EWA, in summary, will offer significant new opportunities, but the implementing agencies will need to manage their actions even more carefully than before to take maximum advantage of the opportunities and to avoid the concomitant risks. Effective management of the opportunities and risks, in turn, will require the development and use of new analyses and tools. In our review this year, we were pleased to see that some of the implementing agencies had begun to develop such tools. A good example is the EWA Water

Purchase Model (or Spencer Model) developed to help the EWA manage water debt and water exchanges on a long-term basis. More work, however, needs to be done to ensure that the EWA can evolve effectively into a long-term program. The implementing agencies, in particular, must ensure that they are incorporating up-to-date modeling techniques and information and developing tools that reflect the level of uncertainty inherent in a long-term program.

## **Challenge 2: Demands for Increased Accountability**

The EWA began as an experiment that might or might not prove to be an effective management tool. It was expected to provide greater protection for the listed fish without interrupting water deliveries. Three years later, most observers view the EWA as a success. The EWA has been able to acquire and manage water in ways that have reduced take at the pumps while maintaining water security for urban and agricultural users. However, a longer-term commitment to the EWA is being discussed that would likely include greater financial and other flexibility, as well as funding at least in part through user fees. Such a long-term EWA would be subjected to a different level of scrutiny. As a Panel of user group spokespersons stated at this year's EWA review meeting, it is no longer sufficient for the EWA to preserve the peace among users and to operate to avoid an ESA-driven shutdown of the pumps. Instead, stakeholders want to see that use of EWA resources actually helps move listed fish and the ecosystem toward recovery, and does so efficiently and without detrimental social side effects.

Among the factors leading to increased emphasis on accountability is the broader context in which government agencies in the areas of environmental health are being expected to base their actions on "best available science". While traditionally the strongest voice in favor of sound and credible science comes from the scientific community, user groups and the general public increasingly value "good" science. Spokespersons for user groups at the EWA review meeting stated without exception that they could live with decisions that went against their individual interests if and only if the decisions were based on good science. Evidence of the generally high level of concern about the quality of science in government includes the enactment in 2001 of the federal Data Quality Act, which calls on the Office of Management and Budget to issue guidance to federal agencies for ensuring the quality, objectivity, utility, and integrity of information they disseminate.

Other forces increasing the pressure for greater accountability in the EWA specifically are the rising expectations for accomplishments in ecosystem recovery and broader concerns about impacts of the program on water markets. The focus of concern has appropriately shifted away

from avoiding excessive “take” of endangered species toward ecosystem health. This latter goal is far more ambitious and amorphous and needs to be translated into clear benchmarks against which the accomplishments of the EWA can be measured. Further, while the program is a relatively small investment compared to the entire CalFed program, it is still expensive. In a time of shrinking resources for many worthy environmental programs, greater attention is being directed toward the most efficient allocation of resources.

The EIR/EIS key issues briefing received by the Panel raises a number of issues relative to a longer term EWA, including whether and to what extent the amount of water devoted to the EWA should increase, and the effect any increase might have on prices and availability in the water market. Further, there may potentially be impacts of a larger EWA upon the availability and quality of groundwater storage in some places and on air quality. While the EWA Panel was offered no evidence that such impacts are likely, they nonetheless fuel added demands for accountability. Public comments clearly demonstrated that some stakeholders are very concerned about the potential impacts of an expanded EWA on the water market, and that those concerns are bringing greater scrutiny on the EWA.

New funding mechanisms that will shift some of the burden for funding the EWA away from the public treasury and toward user groups through fees, transactions, and wheeling costs and other “user-pays” tools raise a number of questions. It seems likely that the users who pay the additional charges will expect to see clear benefits from those payments. This increased attention can be important in fostering transparency and accountability, but must be incorporated in a balanced manner. Those who pay for the program may want and expect to have an amplified voice in program choices in order to ensure that funds provide clear benefits. At the same time, any greater role they are given must not come at the expense of the broader public concerns about the health of the ecosystem. Regardless of how these issues play out over the next decade or so, increased attention to accountability seems inevitable. This new level of accountability makes it more important than ever that the EWA develop transparent goals and performance measures, and will only increase the demand for regular evaluations.

## **2003 EWA Panel Recommendations**

### **Recommendation 1. Continuation of annual science reviews.**

The Panel recommends continuing annual reviews of the EWA for several reasons. First, preparation for the annual review stimulates further cooperation among the different management and regulatory groups responsible for the EWA as they examine their actions during the preceding year. Ideally this would give them a chance to analyze, under conditions that might not be quite as time-pressured as when they are making their decisions, how they responded to the different factors that affected their decisions and how events played out subsequent to their decisions.

Second, the annual review forces a level of documentation of EWA actions and EWA-related research and analysis that allows the stakeholders to carefully review the degree of progress made in terms of protection and restoration of listed species and in terms of learning (as in the adaptive management paradigm) about what management actions can have demonstrably positive or negative effects. In this regard, future evaluations of the EWA should specifically include a section on "lessons learned". Overall, the annual EWA science review stimulates documentation and communication that play an important role in ensuring the transparency and accountability of the EWA.

Third, the review process enhances the scientific value of the work used to support the EWA decision-making process, and thus strengthens the credibility and scientific basis of the EWA. The documentation developed for the review requires a much needed synthesis of the data that might not otherwise happen, and one that is done with the explicit recognition that it will be critically reviewed by a wide spectrum of interested parties (e.g. scientists working for stakeholders). We note that this kind of documentation and review is mandatory for all CalFed funded research; it seems especially important to the Panel that it be done for agency-based research and monitoring connected to the EWA. However, this form of review, which usually involves a lower level of scrutiny than work submitted to peer-reviewed journals, should be considered a necessary first step in the documentation process but not sufficient to complete the process. Peer-reviewed publications, which are much needed but require additional time and effort, would further elevate the credibility of the science supporting EWA. For example, the recent NAS report evaluating water used for fisheries protection in the Klamath basin draws particular attention to the importance of peer-reviewed publications as a measure of the quality of science used in decision-making. Nonetheless, the documentation required for the EWA

review, as well as comments received during the EWA review, increase the transparency of EWA and would also be likely to strengthen manuscripts submitted for publication.

**Recommendation 2. Program documentation and comprehensive program-wide reviews.**

One of the most positive aspects of the EWA during its first three years of operation has been the ability of the EWA agencies and personnel to document their annual water operation activities, summarize the current background information and science used for water management decisions, and respond to new information by re-evaluating their water management strategies. In some measure, these activities have been stimulated or motivated by the annual EWA review process. Whether EWA continues beyond the current 4 year period or not, the EWA agencies have both the opportunity and the responsibility to complete the “experiment” by evaluating and formally documenting the accomplishments and results of EWA activities.

The Panel recommends that the EWA agencies formally review and summarize the accomplishments and lessons learned from the current four-year experiment. Such a program-wide review is critical to documenting 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. The Panel believes a program-wide review is an essential part of the process because: 1) a program-wide review will address some of the Panel’s concerns about adequate documentation of the current EWA operations and how and (more importantly) why the water operations and the science evolved from the initial to the current strategy, and 2) a program-wide review will formalize and complete the process and provide a well-documented basis for the development and the evolution of future environmental water management operations in the Delta.

The Panel recommends that a program-wide review of EWA and EWA related activities occur every 4-5 years. The Panel sees the program-wide review as an opportunity for a comprehensive evaluation of the progress in meeting program-wide goals that are closely tied to EWA and other environmental water management activities and goals. The Panel also sees a program-wide review as an opportunity to foster integration and cooperation among programs with similar goals (see recommendation 3). The program-wide review should be more comprehensive than the current annual review and should include reviews of other science-based elements of CalFed (e.g., Ecosystem Restoration Program activities) simultaneously with the annual EWA review. A program-wide review performed every 4-5 years could provide a forum to focus on topics where faster progress is needed such as addressing the science challenges

related to EWA or the evolution away from take-based measures and toward fish population or ecosystem-level metrics.

**Recommendation 3. More self-conscious integration of the EWA with other programs and tools for environmental restoration.**

As identified in the first and second EWA reviews the Panel again stresses the need for better integration of EWA with other CalFed programs. Below are prime examples of two general areas of opportunity for close coordination and some suggestions on how to proceed. The first, involving upstream flow actions, is an example of increased coordination among CalFed programs. The second, involving Delta actions, illustrates coordination between researchers and managers within CalFed, and also increased cooperation with experts outside of CalFed who are working on similar problems.

*Example 1. Upstream flow actions*

The concern for upstream flow actions was expressed in the report of Brown and Kimmerer (2003).

*Although progress is being made, considerable work remains, especially for assessing population effects. With our present state of knowledge we don't believe it possible to define population benefits with any degree of accuracy. More importantly, we are unable to determine if EWA assets (both money and water) could have been used more effectively than they have been, for example, through more actions using water upstream, or through habitat restoration.*

Presentations to the Panel identified approaches for increased flows and manipulations of water temperature to provide more suitable conditions for adult and juvenile migration, spawning, and egg incubation of salmonids. Such upstream actions require coordination among at least four existing water programs (Water Acquisition Program, Environmental Water Program, b(2) water, EWA). Although the need to coordinate these programs was noted in the presentation of Roger Guinee, it is not clear what efforts are underway to expand the use of upstream water for fish.

Upstream EWA actions in 2002 and 2003 were done on an opportunistic basis and mainly implemented on the American River. However, the EWA needs to consider the potential

for upstream actions on species of critical importance. For example, listed spring chinook are only persistent on unregulated streams in the upper watershed of the Sacramento River (Mill, Deer, and Butte creeks). Increasing flow on these unregulated streams, if possible at all, will require close coordination of the different water programs.

Currently, the potential for increasing upstream survival, beyond what has been achieved with existing water programs, has not been evaluated. To assess the value of further upstream allocations, the Panel envisions a study that would address the following tasks:

- 1) Identify the available upstream water resources according to impacts on specific stocks. In particular, resources that could impact listed winter and spring chinook and steelhead should be identified.
- 2) Assess the impact of additional water resources on fish survival with particular emphasis on prespawning mortality and egg to fry survival, which are the two stages most susceptible to flow fluctuations and temperature variations. The study should address existing literature (e.g. Jager et al. 2003) and coordinate with ongoing water impacts studies (e.g. Kramer's modeling study).
- 3) Estimate the benefit of upstream actions relative to Delta actions by expressing both in a common measure, such as relative adult salmon equivalents. Expressing adult equivalents need only consider the freshwater stages of one complete life cycle. A comparison of upstream versus Delta allocation of resources will be required to justify any significant change in policy. However evaluating the benefit of upstream actions for salmon against Delta actions for Delta smelt is more difficult. The review should discuss trade-offs between species.
- 4) Identify policy level issues needed to coordinate changes in upstream water actions that are now distributed across the four water programs.

This is one example of a study that would document ecological benefits of increased coordination among the various water programs. Studies such as these are important to ensure that the available science is being used in EWA decision-making.

### *Example 2. Delta actions*

Research on the Delta Cross Channel, Franks Tract, and Clifton Court gate operations significantly advanced the understanding of flow, salinity, and fish dynamics through the Delta. Prior to these studies, movements of energy and materials were often characterized only in terms of net flow. The new studies clearly showed that the movements of water, salinity, and fish are strongly affected by tidal oscillations and are modified to varying degrees by operations of the Delta Cross Channel and Clifton Court gates and pumps. The new knowledge presents new opportunities for managing fish and salinity distributions in the Delta.

However, the translation of this knowledge into operational improvements is moving slowly. In particular, although these studies have been presented orally many times few, if any, have been published in peer-reviewed journals or in comprehensive technical reports. Furthermore, with the exception of the work on designing salinity control structures in Franks Tract, plans to apply the research have not been developed or proposed. Clearly, the justification of the studies was to provide a background for improving Delta operations. The Panel believes that the researchers need to better document and publish their results and begin applied follow-up studies that will result in improved Delta operations.

Although the work characterizing the tidal scale velocities and fish trajectories through the Delta Cross Channel was significant, it is another matter to alter fish trajectories with the intention of diverting fish from the Delta Cross Channel. The same challenge exists for keeping fish from entering Clifton Court Forebay. The fish passage community has struggled with the challenge of diverting fish into passage channels for decades, and only recently has their research moved beyond the trial and error approach. In particular, recent work combining computational fluid dynamic models and rheotactic responses of fish, for the first time provide the ability to explore fish diversion designs using computer simulation rather than through the trial and error method, which besides being expensive, has resulted in little success or learning. CalFed and EWA researchers and managers need to engage the fish passage community in developing control devices to divert fish from critical areas including the Delta Cross Channel, Georgiana slough and Clifton Court Forebay. Upon request, the Panel can provide names and contact information for experts in fish passage design.

**Recommendation 4. More effective incorporation of science into the policy and regulatory measures that form the context for EWA implementation.**

In its first three years, the EWA has been closely focused on reducing take of the listed species, winter-run chinook salmon and Delta smelt, at the pumping facilities. That focus is understandable, given the regulatory background. Limits on take at the pumps imposed in the current biological opinions present the clearest threat to water supply reliability. Although in fact pumping has not been sharply curtailed in the past when levels of take exceeded the regulatory limits, water users understandably fear that possibility.

Over the long term, the Panel believes that achievement of the EWA's three goals (protecting Bay-Delta fishes, assuring water supply reliability for project operations, and reducing conflicts in management of the Delta) will require that background regulatory requirements, including biological opinions and water quality standards, be regularly updated in response to new scientific information. There is much we do not know about the population-level responses of fish to a variety of management actions in the Delta system. As the knowledge base increases, it may become apparent that EWA and other environmental water would have more beneficial effects for one or more fish species if it were used for purposes other than reducing take at the pumps. But that adjustment will not occur unless: 1) the knowledge base increases; and 2) the regulatory process responds to the new scientific information.

The Panel understands that the regulatory agencies may be concerned about the resource demands associated with continual updating of regulatory standards. Although we recognize the challenge, we believe that flexibility also can offer important advantages for the agencies. Flexibility can make regulatory standards more defensible in court. Given the current paucity of information, the agencies might find it difficult to defend a biological opinion authorizing long-term operations of the Central Valley Project and State Water Project if that opinion does not provide mechanisms for incorporating new scientific developments. We note that the ESA already requires that the agencies use the best available scientific information in any section 7 consultation, and reinitiate consultation in response to new information. Increased flexibility can also make regulatory standards more politically durable, by preempting complaints about their scientific basis.

The Panel also understands that stakeholders may not welcome the idea of standards that continually evolve. The regulated community may prefer standards that are fixed for all time, providing certainty as to the requirements they must meet. They might, however, be willing to

accept reductions in certainty in return for the possibility that updating might result in relaxation of restrictions at the pumps. Environmental advocates, on the other hand, may be concerned that any flexibility will be used to weaken standards in order to avoid politically difficult confrontations. Both sides might be reassured if boundaries could be drawn around the potential parameters of change, and if the science used to update the standards is conducted with a high level of transparency, outside review, and public oversight.

Delta water quality standards and the biological opinions on the effects of operation of the Central Valley Project and State Water Project on the delta smelt and winter-run chinook are currently under review. The time is ripe, therefore, both for the updating of regulatory standards with knowledge gained over the last several years, and for the creation of adaptive standards that will facilitate incorporation of new scientific information in the future. Before the regulatory agencies issue new standards, they must review the current state of the science. The EWA could help in this process by continuing to sponsor workshops to identify important knowledge gaps and steps that might be taken to address those gaps. Population models developed for the species, even if crude, would provide a useful start.

The agencies could then craft adaptive standards. It might be possible to determine contingencies in advance, that is, to identify modifications that will be made to the standards based on specific outcomes of the studies. For example, FWS might set take limits at the pump for Delta smelt in terms of absolute numbers for now but might also provide that, if robust abundance estimates are developed, those limits will be replaced by limits expressed as a proportion of the estimated population. Estimates of take could also be adjusted in the future based on the outcome of ongoing studies of predation in Clifton Court Forebay. Alternatively or additionally, the agencies could call for specific studies to address gaps in the existing information, and commit to reexamining specific aspects of the standards (such as take limits) when the results become available. EWA managers should be willing to dedicate resources (i.e. funds or water) to the needed studies. The EWA could also assist in the process by sponsoring workshops to review and explore the information germane to developing new adaptive standards.

#### **Recommendation 5. Increased mobilization of resources to address critical science needs.**

Perhaps the central issue and biggest challenge facing EWA in the future is the ability of EWA agencies to develop a sound scientific basis for water management decisions. Clearly the level of sophistication of EWA management decisions must continually improve to insure EWA is making the best use of available water resources to fulfill the EWA mandate. The Panel

believes that to fulfill its potential, the EWA will require a directed effort to further advance the science underlying water management decisions. This effort must include marshalling the appropriate expertise and manpower to begin addressing the science recommendations and challenges detailed in the previous two EWA review reports. These efforts should also include data synthesis and interpretation by the agencies collecting the data and the opportunity for outside synthesis if critical data cannot be synthesized “in-house” in a reasonable timeframe. The Panel is encouraged that the forthcoming PSP will request research directed at the science challenges and that some resources and attention of the agencies have turned toward addressing critical scientific issues.

The Panel is disappointed and perplexed that, in spite of the critical importance of these scientific issues, all potential avenues for progress have not been fully exploited over the past two years. The Panel recognizes that in the current economic and political climate there are few opportunities to add new programs or state personnel to address these needs. Nevertheless, the Panel has in the past offered a number of constructive mechanisms to begin the process, which the Panel believes are workable under current conditions (see previous reports). Those proposed mechanisms included: 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.

## **Summary and Concluding Remarks**

This report is the review Panel’s third annual evaluation of the EWA. The Panel cautions readers of this report to be aware that many of the recommendations and topics of concern made in the previous two Panel review reports, not repeated here, remain highly relevant to EWA operations in 2003 and beyond.

Five positive findings were noted: (1) increased diversification of water resources and the development of models of water acquisition, storage, and debt, (2) evidence of increasing cooperation among agencies and in the design and execution of field experiments, (3) several successful symposia and workshops, (4) further progress on addressing the Panel’s past recommendations (e.g., basis of decision trees), and (5) avoidance during the past year of fish and water crises.

As the EWA experiment enters its final year, there is talk of EWA continuing as a long-term program. The shift from a short-term to a long-term program will change the frame of

reference for EWA operations and the evaluation of EWA performance. Two important factors that arise with a shift to a long-term program are the need to manage long-term risk and opportunities and increased accountability. A long-term program would allow greater inter-annual considerations, thereby providing the agencies with greater flexibility acquiring and using water resources, a potentially larger water market, and an opportunity to develop a more adaptive biological opinion that uses the EWA as a source of information and experience. The new or increased risks associated with a long-term EWA include the need to manage (acquisition and use) water resources more carefully, and the possibility of greater risks to third parties due to long-term management actions by the EWA. A long-term EWA will likely also involve increased accountability due to the general increased national emphasis on using the best available science for environmental decision-making, a likely shift from the present focus on avoiding excess take to the broader long-term goal of improving ecosystem health, and new funding mechanisms for EWA that involve user groups.

With these two factors as a backdrop, the Panel identified five major recommendations that relate to current EWA operations and to longer-term EWA operations should the program be extended. First, the Panel recommends continuing annual reviews of the EWA because such reviews foster communication, collaboration, documentation, and transparency. Second, the Panel recommends that the EWA agencies formally review and summarize the accomplishments and lessons learned from the current four-year EWA experiment. Such a program-wide review is critical to document the successes and disappointments of the EWA and to provide a sound basis as the EWA looks toward the future. These program-wide reviews should be performed every 4-5 years and are in addition to the annual science reviews. Third, as identified in previous EWA review reports, the Panel again stresses the need for better integration of EWA with other CalFed programs. Two examples were provided that illustrate specific areas that would benefit from increased cooperation. The first example involving upstream flow actions illustrates the benefits from increased coordination among CalFed programs. The second example involving Delta actions illustrates the benefits from increased coordination between researchers and managers within CalFed, and also increased cooperation with experts outside of CalFed who are working on similar problems. Fourth, the Panel recommends that background regulatory requirements, including biological opinions and water quality standards, be regularly updated in response to new scientific information and be made as adaptive as possible. Adaptive regulatory requirements will greatly enhance EWA's ability to efficiently achieve its three goals of protecting Bay-Delta fishes, assuring water supply reliability, and reducing conflicts. Fifth, the Panel strongly recommends that creative ways to address the many scientific challenges facing EWA be fully explored. The Panel was disappointed that, in spite of the critical importance of these scientific issues, relatively little progress had been made on marshalling resources and

people to do the work. The Panel was encouraged that the forthcoming PSP will request research directed at the science challenges, and that some incremental progress has been made on some of the specific challenges. But one of the central issues and biggest challenges facing EWA in the future is the ability of EWA agencies to develop a sound scientific basis for water management decisions. Development of this scientific basis requires additional manpower.

In conclusion, the Panel was generally impressed with the last year's EWA activities. Significant progress was made in several important areas related to the science underlying the EWA. There are still areas that require additional attention and effort in order to elevate the science to the next level. If EWA moves from an experiment to a long-term program, the Panel cautions against simply continuing with a "business as usual" approach. The success of a long-term EWA will depend on careful evaluation of the four-year EWA experiment, and even more use of sophisticated tools and increased cooperation and documentation. At this point, it appears that adding new people with the appropriate skills to address these challenges is one of the major factors limiting the advancement of the science needed by the EWA. Present staffing is doing an admirable job but they are simply not enough to enable significant progress on some of the important science challenges. This science will be needed in the near future to ensure the EWA is using the best available science.

## Appendix 1. EWA Review Panel 2003

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