

**CONSIDERATION OF A RESOLUTION ESTABLISHING AN INDEPENDENT
SCIENCE BOARD
Agenda Item: 8**

Meeting Date: 8-14-03

Summary: This resolution would establish the Independent Science Board, comprised of a board of independent scientists nominated by the Lead Scientist for the California Bay-Delta Program.

Recommended Action: Adopt Resolution 03-08-03.

Staff Recommendation: Staff recommends that the Authority adopt the attached resolution, which would establish the Independent Science Board.

Background

This action item requests the Authority to establish an Independent Science Board by confirming a panel of independent scientists nominated by the Lead Scientist and by approving the charge to the Board, as proposed by the Science Program. The California Bay-Delta Authority Act states: “The Lead Scientist shall nominate, and the Authority shall establish, a board of independent scientists, to be known as the Independent Science Board, that shall advise and make recommendations to the Authority and the Bay-Delta public Advisory Committee, as appropriate, on the science relative to the implementation of all program elements.” (Water Code sec. 79470(a).) The charge to the Board, its relationship to the Authority and existing independent panels, how it functions, general qualifications of nominees, desired balance of expertise across the Board, and the individuals nominated by the Lead Scientist are summarized in the supporting material below.

The Independent Science Board is designed to be a standing board of distinguished experts (scientists and engineers) made up of individuals with a range of multi-disciplinary expertise balanced among those with local experience and those with external relevant expertise. These experts will help the Authority establish a balanced view of the science issues that underlie important policy decisions. The Independent Science Board will not pass direct judgment on the success or failure of the Authority’s programs, but provide insights that can make the science underlying those programs, the application of that science, and the technical aspects of those programs the best they can be. This includes overseeing the goal of explicitly characterizing the

status of knowledge and identifying assumptions and uncertainties. The Independent Science Board as a whole will include the necessary expertise to cover the breadth of Bay-Delta Program issues.

The Independent Science Board members will be charged with undertaking the following tasks (described in more detail in Attachment 1):

- Understand the technical underpinnings of the Bay-Delta Program.
- Evaluate and provide insights on progress toward addressing underlying premises of the Bay-Delta Program.
- Annually evaluate the science agenda.
- Assure balance and credibility of analyses and reviews conducted by other standing panels and boards.
- Review and approve performance measures.
- Assure science is used in all programs.
- Identify impending issues and significant interconnections.
- Work with the National Research Council.
- Help select the Lead Scientist in the event of a vacancy.

The Independent Science Board will advise and make recommendations to the Authority and the Bay-Delta Public Advisory Committee, as appropriate, on the science relative to implementation of all program elements. It will be expected to produce a written report once every two years on the state of science across all Bay-Delta Program efforts. Independent Science Board members may be asked to testify on their evaluations before the Legislature or Congress.

The Independent Science Board would be one element of the independent review system the Authority and Bay-Delta agencies have used, and will continue to use, to integrate review and advice across the Program. There would be three levels of working groups: technical panels, standing boards, and the Independent Science Board (see organization chart, Attachment 2). The Independent Science Board would focus on cross-program issues and assure that reviews conducted by other boards and panels are balanced. Some members of existing standing boards and technical panels have been nominated to the Independent Science Board to facilitate communication across the review system. The Science Program and Lead Scientist manage this current system, which came about due to the number of technical issues that the Program confronts, and the complexity of these issues.

The Independent Science Board will meet approximately three times per year unless experience dictates a greater or lesser meeting frequency. Membership on the Independent Science Board will be constant for the first four years, and then a progressive rotation of 5 board members per year will begin. Independent Science Board membership for an individual may be renewed up to two times at the request of the Lead Scientist, with concurrence from the Authority.

Independent experts are agents for facilitating communication between the Authority and the scientific and management community. Therefore, they must have the highest level of expertise and stature so that their advice is respected by the public, scientists, agency technicians, agency staff, BDPAC, and management. The ability to sustain a balanced view of issues is just as important as stature in an independent expert. It is critical that the expert (or advisor) have a

reputation for willingness to listen to opposing views, willingness to change one's mind in the face of evidence contrary to an original view, and willingness to separate one from biases associated with employment or professional associations. Thus, for an independent expert to be nominated by the Lead Scientist requires the individual have a track record of all or most of the following (described in more detail in Attachment 1): scientific stature; advisory experience; technical publications; relevant knowledge; people skills; reputation for achieving balance; and interdisciplinary skills.

Program staff has spent considerable time and energy in their search for the initial nominees to the Independent Science Board to attain a multi-disciplinary, balanced approach and a balance between local and external experience. Attachment 3 lists the initial 19 nominees. We expect the Independent Science Board membership to grow to address additional needed expertise and that this process will occur as more programs begin to use advisory and review panels, but that the Board will be no larger than 25 members total.

Item History or Previous Background Action

The charge, structure, and design of the Independent Science Board have been reviewed by the Bay-Delta agencies and BDPAC.

Fiscal Information

Independent Science Board members will be compensated for their time as is standard when participating on a standing board or technical panel. Funding for the Independent Science Board is part of the Authority's Science Program budget.

Attachments

Use of Technical Experts by California Bay-Delta Authority's Bay-Delta Program
Independent Science Board Organization (chart)
Individuals Nominated to the Independent Science Board by the Lead Scientist

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CALIFORNIA BAY-DELTA AUTHORITY
RESOLUTION NO. 03-08-03

CONSIDERATION OF A RESOLUTION ESTABLISHING AN INDEPENDENT SCIENCE BOARD

WHEREAS, the California Bay-Delta Authority Act requires the Lead Scientist to nominate, and the Authority to establish, a board of independent scientists, to be known as the Independent Science Board, to provide advice and recommendations to the Authority and the Bay-Delta Public Advisory Committee on science issues related to all California Bay-Delta Program elements; and

WHEREAS, the Lead Scientist has nominated a panel of individual experts to serve on the Independent Science Board and defined the charge and role of this Board;

NOW, THEREFORE BE IT RESOLVED that the Authority confirms these nominees as official members of the Independent Science Board and approves the charge and structure of the Board as proposed by the Lead Scientist, *except that members of the Board shall serve for an unspecified term, at the pleasure of the Authority.*

CERTIFICATION

The undersigned Assistant to the California Bay-Delta Authority does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the California Bay-Delta Authority held on August 14, 2003.

Dated:

Heidi Rooks
Assistant to the California Bay-Delta Authority

Attachment 1

Use of Technical Experts by the California Bay-Delta Program

An important function of the Science Program is to provide an on-going assessment and analysis of use by the California Bay-Delta Program of “world class science” and adaptive management, as required by the California Bay-Delta Authority Act (Act) and the Record of Decision (ROD), which defines the program. The use of technical experts is critical to accomplishing that goal. This document justifies that need and explains the strategy used to incorporate expert insights into the many complex issues being addressed by the Bay-Delta Program.

Role of Science in the Activities of the Bay-Delta Program

The ROD mandated creation of a “CALFED Science Board” (i.e., California Bay-Delta Authority Independent Science Board). The concept was that incorporating review, insights and/or advice from independent experts with knowledge and experience relevant to a specific Bay-Delta issue would benefit the actions necessary to achieve CALFED’s multiple goals. The precedent for obtaining advice from academic experts was begun before the signing of the ROD by the CALFED Ecosystem Restoration Program. Subsequently (after September 2000), a formal process for obtaining input from independent experts was developed, and is now required by the Act. The Science Program is progressively implementing this process.

As the actions of the Bay-Delta Program are being implemented, the Bay-Delta agencies intend to incorporate stakeholder participation and science-based adaptive management. The goal is to ensure that the best possible scientific information guides decision-making within every aspect of the Program, while results of Program activities are closely evaluated. Thus oversight of data collection and ecosystem monitoring, along with scientific review of actions and decisions is essential. To cite the ROD, “The highest quality and credibility of science-based decision making will be assured by the integration in the Program of an independent board of scientific experts.”

Both the ROD and the Act call for the appointment of a Lead Scientist, who is supported by an explicitly defined “Science Program” (a standing program). To facilitate the integration of sound science into CALFED operations and management decisions, the Science Program strives to

1. Enhance communication about the status of critical scientific knowledge among scientists, management, and the public (including recognition of assumptions and uncertainties).
2. Increase the body of credible scientific knowledge (research, monitoring, assessment and data interpretation to narrow uncertainties).
3. Advance and sustain the credibility of the science that is used to evaluate and/or support the actions of the Program.

Improved communication is being accomplished through workshops, conferences, white papers, creation of an online journal, and increased science collaboration with program managers. To

increase the body of knowledge of long-term monitoring, applied research and academic research are supported by the Authority and Bay-Delta agencies; and collaboration among scientists from agencies, universities, and the private sector is encouraged. Millions of dollars of new studies are awarded each year in both competitive grants programs and “directed” actions. Credibility is established and sustained through extensive use of independent experts in the peer review of both competitive and directed action proposals. Proposals are awarded only if they are technically competent and relevant. Extensive review by independent experts of technical products, projects, programs, and actions is also common practice.

Existing Structure for Scientific Review

The Science Program’s existing approach for incorporating independent expertise involves three levels of working groups. This somewhat complex system is necessary because of the number of technical issues that are confronted, the depth required to confront each issue effectively, and the different approaches sometimes necessary to obtain review, advice, and insights. The Authority’s Science Program and Lead Scientist manage the overall system. A single science board, even with subcommittees, would be overwhelmed by the combination of the number of issues, the immediacy of many needs for review or advice, and the depth of advice the Authority requires. Therefore, the working groups best suited to the needs of the Bay-Delta Program are technical panels, standing boards, and the Independent Science Board. All members of panels, standing boards, and the Independent Science Board must meet the criteria for independent experts described above.

Technical Panels

Technical panels provide expert input on individual issues, most of which have a finite timeline. Although these are ad hoc groups (each will eventually sunset), they meet and re-meet over the full term of the issue they are addressing. These groups work at the greatest level of detail. Each panel includes the full range of disciplinary expertise that spans the particular issue. Balanced perspectives will be a key in all groups. Some members will participate in standing boards and some will not. Three examples of issues that are being (or have been) addressed using such panels follow. Other examples are available if desired.

- **Actions to address the barrier to salmonid migration from the San Joaquin River created by seasonal low dissolved oxygen conditions in the Stockton Ship Channel.** The ROD advised that \$40M be spent to bring a solution to this issue and funding was passed in Proposition 13, in FY2000. A review panel conducted three reviews (to date) of proposals for studying the problem, made progress in identifying the causes of the problem, and proposals for solutions. The panel was comprised of academics of international stature with expertise in eutrophication and water quality management. The panel was not asked to recommend a solution; but to advise on the progress toward identifying causation, solution proposals, and implementation. The first review was a mail review of the proposals, and the second was a written review of proposals with a synthesis by a leading local independent expert. The third involved facilitated public presentations of progress and proposals for solutions in front of the review panel, followed by a written review and analysis by the panel. The reviewers first recommended an entire revision of the proposals (no funding). The second and third reviews recommended that specific (not all) studies proceed. They specifically suggested substantial redirection of water quality modeling, helped with data interpretation, and provided insights on a proposed pilot program to install aeration as a temporary solution. The agencies responded

by competitively funding two new water quality modeling studies, dropping some of the old studies, and proceeding with the pilot program (whose outcomes will be reviewed in 2003).

- **Mercury.** Because of the long history of mercury mining in this watershed and the potential of restored wetlands to methylate mercury, this is deemed a major issue in the Bay-Delta watershed. About \$2M per year is now being invested in understanding the significance of the mercury threat and monitoring changes. It is anticipated that will grow to \$3M to \$4M per year for five years. Since 1999, a team of academic experts in mercury issues have conducted three reviews of progress in programs funded to advance understanding of the mercury issue in the Bay-Delta watershed. They provided insights on program direction and interpretation in the first two years, and the programs were modified accordingly. The panel was specifically instructed not to judge whether the existing studies were successes or failures (in general), but to identify weak links in the existing work and make constructive recommendations about future studies and directions. Most recently they convened a public workshop bringing in national experts on mercury issues to work with local scientists in developing a comprehensive, unified, regional-scale strategy for understanding and monitoring mercury problems. That strategy will be released in February 2003, with RFPs for multi-disciplinary team investigations to follow.
- **Listing of the Sacramento splittail under the ESA.** A panel composed of local experts on one of the species considered for listing under the ESA (the Sacramento splittail) by the U.S. Fish and Wildlife Service (USFWS), was convened in a public workshop in early 2001, to provide input to the agency during the window for public comment. Questions for the panel were assembled from the USFWS and an organizing committee (comprised of the Lead Scientist and some splittail experts). The panel was specifically instructed not to draw judgments about the splittail biological opinion itself or whether the species should be listed. The panel provided insights about the status of knowledge of the species, including threats, restoration needs and new interpretations of existing data. A population model was used in real time to evaluate the needs of the species and the probability of extinction under different climate scenarios. A written summary of the workshop was provided to the USFWS and is available on the Science Program website:
(<http://www.calfed.water.ca.gov/Programs/Science/Science.shtml>).

Standing Boards

Standing boards combine the expertise and experience of individuals who together can represent the range of interdisciplinary knowledge of the variety of issues and challenges that converge in a program, a complicated issue, a specific region (e.g., the Delta), or a circumstance where multiple issues collide. It is expected that many of these individuals will or will have participated in detailed analyses of narrower issues (e.g., on the technical panels). Thus the standing boards will bring to bear the nation's best expertise on the Bay-Delta's most complicated and many-faceted issues, and bring continuity to that effort. Each board will be composed of experts appointed by the Lead Scientist in collaboration with the relevant Bay-Delta activities. Standing boards (or members) review, advise, provide insights, and raise questions that help the agencies anticipate upcoming issues; evaluate scientific practices or issues; and help develop scientifically sound programs to complement each standing program's actions. Board members are paid but may participate in studies or projects where those activities

do not directly conflict with any specific advisory or review role. Examples of standing boards are outlined below.

- **Independent Science Board of the Ecosystem Restoration Program.** This board of 13 international experts (identified at the Ecosystem Restoration website) was convened in 1999, by the Ecosystem Restoration Program. It meets four times per year to discuss program activities in public session with ERP staff and the Science Program. Subcommittees of the board have aided in implementation of the ERP Strategic Plan (which some board members were invited to write); helped design early work plans that developed solicitations for restoration (and associated science) proposals; anticipated or initiated heightened discussion of issues relevant to successful implementation of the ERP (e.g. the need for studies to evaluate the value of fish screens); participated in or facilitated progress of reviews (white papers) of major issues that ERP needs to address; developed a system-wide conceptual model to guide systematic implementation of restoration; advanced adaptive management practices by leading workshops in local settings; designed several alternative large scale adaptive management experiments (in a workshop setting); sponsored national gatherings of experts to discuss implementation of adaptive management; and promulgated understanding of adaptive management among stakeholders and the Bay-Delta implementing agencies.
- **Review Panel for the Environmental Water Account.** This panel was convened in October 2001, to annually review and provide expert advice during the four year trial period of the Authority's innovative Environmental Water Account (EWA). The panel is composed of 12 experts from throughout the United States (institutions range from Stanford University to Louisiana University Marine Consortium; expertise ranges from fisheries biology and hydrodynamics to environmental law and social science). The experts were explicitly asked not to determine if the EWA was a success or a failure (a policy judgment), but to address fundamental assumptions and uncertainties and ways that the EWA could be improved. In its two reports (see the Science Program website), the panel has identified strengths (e.g., daily collaboration in managing water and environmental resources in tandem) and weaknesses (questionable commitment of resources and need for greater ecological knowledge, with specific recommendations) in the EWA. In its second meeting, the panel recommended some specific management, research, and adaptive management endeavors that could be undertaken to improve the EWA and asked for responses from the agencies with regard to these suggestions. In addition, the Science Program has contracted two independent experts to work directly with the water and wildlife managers who cooperatively manage, on a day-to-day basis, water diversions, environmental resources, and environmental water. The advisors report to the Lead Scientist. They provide broad scientific advice to the agency managers (but do not oversee daily decisions) and provide inside, independent knowledge of the system for the EWA panel and the Lead Scientist. They also have played a major role in communicating and advancing the state of science underlying water management.

Definition of "Independent Expert"

Independent experts are defined by their academic credentials in specific areas of needed expertise. Except in specifically defined circumstances, they have little or no direct stake in the

issue for which they are advisors. The experts are typically paid for their work by the Authority, unless they are Federal or State employees (whose hours may be reimbursed to their employer). Typical activities of independent experts include the following:

1. Bringing detailed expertise to bear on scientific issues of concern. This may include characterizing the status of knowledge about critical issues; identifying key scientific issues, or helping staff prioritize issues. Other duties include organizing or participating in workshops on critical subjects, and/or identifying, proposing, prioritizing, or writing white papers or reviews. Some expert advisors have identified pending issues before they become critical or worked directly with managers, staff biologists, or operating engineers to help them take into account broader scientific practices, principles and implications.
2. Reviewing, advising, or providing technical insights for documents, proposals, or programs. Programs can include either issues that require multiple studies or proposals for an action by implementing agencies, such as changes in conveyance, threats to levees, and restoration strategies.
3. Analyzing existing data related to specific actions or programs as relevant to reviews or advising as described above.
4. Designing, conducting, or leading studies relevant to accomplishing Program goals that are not in conflict with review roles.

Qualifications of Independent Experts

Independent experts are agents for facilitating communication between the Authority and the scientific and management community. Therefore, they must have the highest level of expertise and stature so that their advice is respected by the public, scientists, agency technicians, agency staff, BDPAC, and management. The ability to sustain a balanced view of issues is just as important as stature in an independent expert. It is critical that the expert (or advisor) have a reputation for willingness to listen to opposing views, willingness to change one's mind in the face of evidence contrary to an original view, and willingness to separate one from biases associated with employment or professional associations.

Thus, invitation to be an independent expert requires all or most of the following:

- Scientific stature. Evidence of stature in the broad scientific community (invited contributions to workshops, conferences or panels; evidence of scientific leadership; awards, membership, or important committee assignments in prestigious organizations).
- Advisory experience. Experience advising top managers and promoting constructive uses of environmental science, especially in arenas relevant to water management and/or ecosystem restoration.

- Technical publications. A strong record of publication in peer-reviewed scientific literature in an area of expertise relevant to the issues at hand.
- Relevant knowledge. Evidence of extensive and/or intensive working knowledge of a scientific field related to the specific issues of concern.
- People skills. Evidence of abilities to work and communicate well with people.
- Reputation for achieving balance. Evidence of ability to weigh issues in a balanced manner when in an advisory capacity.
- Interdisciplinary skills. Evidence of ability to work and think across disciplines, and/or experience in working with and advising on complex issues that integrate multiple disciplines.

Charge to the Independent Science Board of the California Bay-Delta Authority

An Independent Science Board is called for in the CALFED ROD (August 2000) to ensure the application of world-class science to the California Bay-Delta system. Similarly, the Act requires an Independent Science Board to provide this function.

The Independent Science Board would be a standing board of distinguished experts (scientists and engineers) who would directly advise the Authority and BDPAC, as appropriate, on the application of science and the effectiveness of science practices across the Bay-Delta Program. The Independent Science Board would not be asked to pass direct judgment on the success or failure of Bay-Delta programs, but to provide insights that can make the science underlying those programs, the application of that science, and the technical aspects of those programs the best they can be. This includes overseeing the goal of explicitly characterizing the status of knowledge and identifying assumptions and uncertainties. Independent Science Board members would be paid. Many of the members of the Independent Science Board will also be members of existing standing boards and technical panels. The Board as a whole should thus include the necessary expertise to cover the breadth of California Bay-Delta issues. It is expected that the Independent Science Board will grow beyond the initial appointees to address the necessary expertise, but will be no larger than 25 members total. The specific charge of the Independent Science Board is outlined as follows.

The specific charge of the Independent Science Board is outlined as follows:

1. Understand the technical underpinnings of the Bay-Delta Program. Work with the Lead Scientist and the Science Program to effectively incorporate science into large scale water management and restoration programs. As a group, the Independent Board should have and sustain an up-to-date understanding of the Authority's proposed actions and the state of the science applicable to those actions.
2. Evaluate and provide insights on progress toward addressing underlying premises of the Bay-Delta Program. Implicit in the CALFED ROD are basic premises about balanced progress toward achieving the four goals of the program. Can outcomes of ecosystem restoration balance outcomes of modifications of water

diversion? Should ecosystem restoration proceed across the Delta or avoid areas influenced by stressors such as the diversion pumps? How does the program balance the benefits of bioavailable carbon genesis in restoration projects with the adverse consequences of DOC for drinking water? An important mission of the Board is to explicitly identify the fundamental premises and help the program track progress toward addressing the technical aspects of these.

3. Annually evaluate the science agenda. Annually provide insights and evaluation on the implementation of a strategic, balanced, and proactive science agenda across the entire program. Evaluate technical priorities, adequacy of funding, peer review, use of outside experts, and the successes and weaknesses of the investments in gaps in scientific knowledge. Evaluate progress on the development of an authoritative body of knowledge relevant to each goal and program of the Authority. Help identify where important gaps in knowledge or the science effort might exist, with an emphasis on considering interconnections among different elements of the Program.
4. Assure balance and credibility of analyses. Provide insights in an annual report as to whether the analyses of the state of the science being applied to specific issues under the purview of the Authority are balanced and credible, including insights on how to improve such analyses in general or in the case of specific issues.
5. Approve performance measures. Evaluate and provide final approval of performance measures for the Bay-Delta Program, assuring scientific rigor and balanced interpretation of each measure and its updates.
6. Assure science is used in all programs. Compare development of science in different standing programs of the Authority and give advice on how to move science forward in all programs (including advice on selection of experts of advisory functions or standing boards; evaluation of science priorities).
7. Identify impending issues and significant interconnections. Help the Authority anticipate issues and identify areas of interconnection among programs that might otherwise be missed by more specialized boards and panels; and suggest solutions, where needed, to interconnecting issues (e.g., technically-based actions, workshops, reviews, RFPs, program collaborations, or new research).
8. Work with the National Research Council. Work with National Academy of Sciences and National Research Council board representatives to develop broad questions suitable for outside review by the National Research Council.
9. Help select the Lead Scientist. Working closely with the Director, the Independent Science Board will lead and oversee the selection process when the Lead Scientist position is vacant. This will include making a recommendation to the Authority on the nomination of potential candidate(s).

The Independent Science Board's proposed role is one of overview rather than initiating reviews. The Independent Board cannot rescind the technical results of standing boards or technical panels or any other working group. But the Independent Science Board will review the activities of those groups for balance, rigor, and use of authoritative science. It is expected that individual

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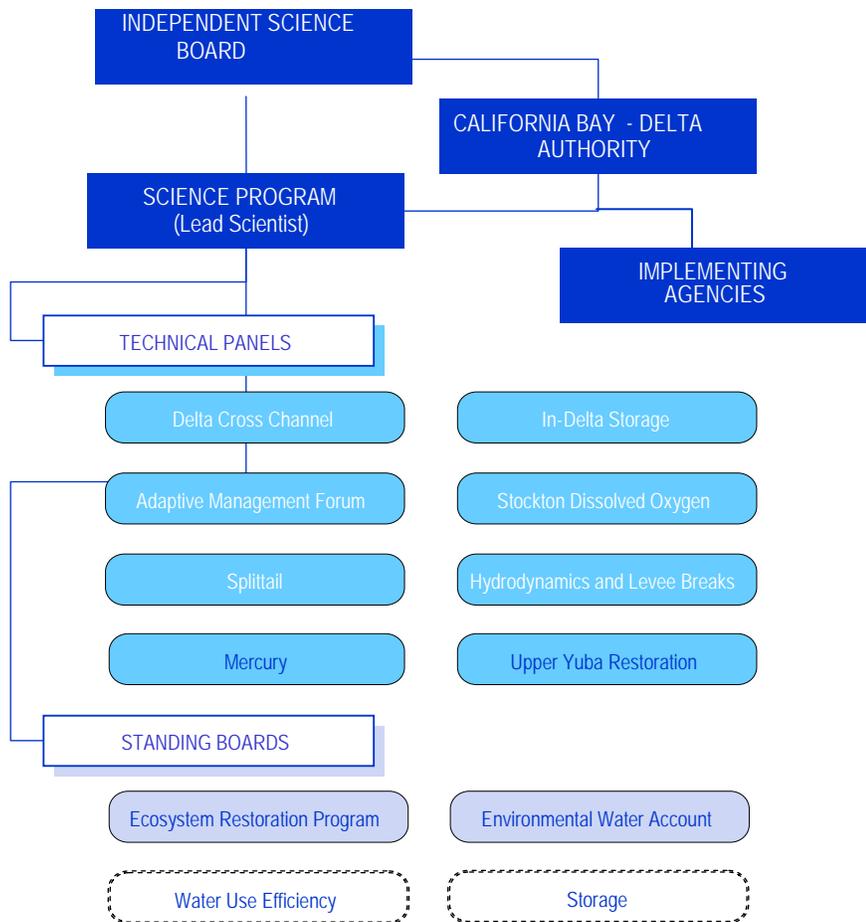
standing boards will continue to act with independence with regard to their areas of assignment; although they might consult with the Independent Science Board for insights and suggestions to aid these activities. Like all technical expert bodies, the Independent Science Board will not be asked to make policy decisions, but it will provide insights on how to improve credibility, improve clarity, and advance the debate about Bay-Delta issues, as well as how to better connect science and management.

The Independent Science Board will be expected to produce a written report once every two years on the state of science across the entire Bay-Delta Program. Board members may be asked to testify on their evaluations before the Legislature or Congress. The Board will meet approximately three times per year unless experience dictates a greater or lesser meeting frequency. Membership of the Board will be constant for the first four years, and then a progressive rotation of 5 board members per year will begin. Board membership for an individual may be renewed up to two times at the request of the Lead Scientist, with concurrence from the Director and the Authority.

Attachment 2

Science Board Organization

California Bay-Delta Program Science Board and Expert Panel Organization



Attachment 3

Individuals Nominated to the Independent Science Board by the Lead Scientist

Name	Organization	Expertise
Ken Cummins	California Cooperative Fisheries Unit	Riverine Ecology, Entomology
Duncan Patten	Montana State University	Plant Biology, Riparian Ecology
Denise Reed	University of New Orleans	Wetlands Geomorphology, ERP Science Board
Robert Twiss	UC Berkeley	Environmental and Regional Planning
Jim Anderson	University of Washington	Salmonid ecology, modeling, EWA Panel
David Freyberg	Stanford University	Hydrology, hydrogeology, conjunctive use, Delta geology and history, EWA Panel
Helen Ingram	UC Irvine	Environmental and Water Policy
Jeff Koseff	Stanford University	Hydrology and Hydrodynamics; modeling
Kenneth Rose	Louisiana State University	Fish ecology, Population models
Julio Betancourt	US Geological Survey	Hydrologist, climate, paleoclimate in SW
Joan Rose	Michigan State University	Water Quality, health risks
Anne Kapuscinski	University of Minnesota	Fisheries, genetics, conservation biology
Bill Glaze	Oregon State University	Water Quality
Joy Zedler	University of Wisconsin	Restoration Ecology
Judy Meyer	University of Georgia	Aquatic ecology, rivers, organic carbon
Jeff Mount	UC Davis	Geology, geomorphology, floodplains
John Melack	UC Santa Barbara	Limnology (lakes)
John Boland	John Hopkins University	Water use, resource economics
Jack Keller	Keller-Bleisner Engineering	Agricultural irrigation and water conservation