

10/2/01

To: CALFED State and Federal Managers

From: Dr. Sam Luoma, Lead Scientist

\Re: **Annual Report on Science Program/ IEP Relationship—Review of Science Practices Within IEP**

### Background

The Interagency Ecological Program (IEP) is a long-term monitoring program established to provide information on the link between Delta exports and the abundance and distribution of aquatic species in that region. IEP work satisfies numerous permit requirements (CVP/SWP State Board permit & biological opinions), is carried out by staff from four agencies and academic researchers, is primarily funded by water contractors & agency appropriations, and is managed by coordinators from 10 of the CALFED agencies. In addition to meeting these needs, IEP provides a significant amount of technical information useful for CALFED. In particular, the long-term database of species abundance and distribution and the focused work on special status species will form the backbone of any assessment of whether CALFED actions had effects on the Delta system. The identification of the IEP as Category A CALFED program recognizes this relationship.

In November, 2001, IEP and the CALFED Science Program defined the complementary relationship between IEP and CALFED and recommended that the Lead Scientist report to the Management Group on the status of science within IEP and coordination between IEP and CALFED. This program review was prepared in consultation with the IEP Coordinators.

### Report on Coordination Between the CALFED Science Program and IEP

The Science Program conducted a review of the progress the Interagency Ecological Program has made towards instituting and improving specific scientific practices common to all CALFED program efforts:

- Dedicating staff to sustain long-term monitoring programs and make data sets publicly available to all users through the web
- Increase the number of multi-disciplinary, collaborative efforts
- Identify and begin to break down barriers to partnerships with universities and other entities
- Increase the use of proposal formulation, peer review, and publication of interpretive studies
- Establish and make use of independent science advisory groups to continuously improve the scientific practices and information value in program efforts

The review evaluated the strengths, weaknesses, opportunities, and problems of the IEP Program with respect to these practices.

### **Strengths and Accomplishments**

*Science Advisors:* The IEP established a Science Advisory Group several years ago with the charge of conducting external reviews of individual IEP Programs. In 2000, the advisors conducted a review of the Bay monitoring program element. That review highlighted the importance of continuing this unique long-term data set and using the data for more sophisticated analyses of abundance and distribution trends across a wide range of flow regimes. This year, the IEP demonstrated responsiveness to the review by restoring staff to that program and initiating two collaborative interpretive projects designed to produce peer-reviewed publications.

*Peer-Reviewed Interpretations and Making Information Public :* The IEP continues to build on the established practice of requiring staff to prepare proposals for work in the coming year. In general, the quality of those proposals continues to improve. This year, the IEP emphasized the inclusion of written reports as part of all study proposals and is appropriately extending the time frame for each discrete study element to allow for writing. This practice is absolutely critical for bringing program information into the scientific community and making it more accessible to the public. To maintain this progress, managers within the IEP agencies will have to ensure that individual work plans reflect this as a priority as well.

*Cross-Institutional Partnerships:* Three IEP activities deserve special recognition for their effective partnership with researchers outside the agencies.

The IEP established a standing panel of external expert advisors (the Science Advisory Group) several years ago. IEP calls on these experts to review individual program elements and provide advice on scientific issues. The Science Program is using the IEP/SAG relationship as a model for building the CALFED-wide Science Board and ensuring that every CALFED program establishes a working relationship with external science advisors.

The water quality program is undergoing a thorough review that includes assessment of existing data, a refocusing of basic monitoring questions using the latest scientific knowledge of ecosystem processes and critical management information needs, and a new monitoring design. This process is an excellent example of how to integrate new scientific knowledge into monitoring practice as well as being an example of successful collaboration between agencies and researchers who have helped in the effort.

The second example of scientific partnerships is the IEP sponsorship of two collaborative postdoc research fellowships. These two projects match senior agency scientists who have been collecting and analyzing monitoring data, with a recent graduate and an academic mentor. This year, IEP funded and CDFG set aside time and resources for

Kathy Hieb and Randy Baxter to collaborate on statistical analyses of long-term monitoring data sets and co-author papers for submission to peer reviewed scientific journals.

The third example of a successful multi-institutional partnership is IEP staff and agency participation in the Delta Cross Channel studies.

*Breaking Down Barriers to Partnerships:* The primary concern here has been and continues to be the protracted and shifting contracting process. However, multi-year planning can help support efforts to streamline contracting. The IEP has begun using multi-year budgets, is developing strategies for streamlining contracting, and is discussing options for responding to mid-year opportunities.

## **Weaknesses**

*Impediments to Scientific Practices:* IEP has made considerable progress in defining and integrating standard scientific practices within the program, including requiring proposals, review of proposals by work teams, and a periodic review of all major program elements by an external science advisory group. This past year, the coordinators have specifically established an expectation of written, interpretive reports as part of most projects. There are several issues and impediments that the IEP can address over the coming years that will further support better scientific practices and also foster increased integration of IEP into the broader research community:

- Quality of project proposals: Proposals are currently required as part of the IEP funding process, but many do not contain the explicit conceptual models and tightly linked experimental designs common to other CALFED programs;
- Scientific mentorship: The most effective groups within IEP have an informal system of scientific mentorship that builds the capability of junior science staff. Expanding and formally supporting these activities, including allocating time to senior scientists to mentor junior scientists, would continuously enhance the capabilities of current staff;
- Staff time allocation to data analysis and writing: The ratio of staff time spent analyzing and interpreting data is small compared to time spent gathering data. In addition, time allocated to complete written reports is often not enough to include reviews and responses to comments.
- Involving people outside of IEP workgroups for reviews, comments, and ideas: IEP should expand the involvement of external scientists in discussions about experimental design, data analyses, and reviews; and
- Expectations that conclusions and supporting information and rationale will be questioned Integrating IEP work more fully into the broader scientific community requires that individual scientists be prepared to work in an environment where asking questions about conclusions is part of the process of building a robust scientific product.

These issues are not consistent impediments. Instead, they represent patterns that we have found repeated consistently enough across the program as a whole that they warrant attention at the program level.

*Connection to Scientific Community:* Despite its long history of scientific study, the IEP is relatively isolated from the larger scientific community. This isolation stems from the fact that only a few peer reviewed papers have been published, that a very limited number of studies have been conducted in collaboration with outside researchers, and the extreme difficulty state agency scientists face to participate in scientific conferences outside of California. This isolation serves to limit the interaction between IEP scientists and those in the broader research community, which, in turn, affects the credibility of work done by the IEP and stifles the professional development of scientific talent and capabilities within the IEP agencies. During the coming years, the Science Program will be working with the IEP on improving this connection.

*Resource Allocation:* While resource allocation within agencies is not within the scope of the Science Program's review, there are several patterns of resource allocation that affect the conduct of scientific practices and undermine existing work of high scientific quality. CALFED agency managers and policymakers need to be aware of these patterns.

The first pattern involves shifts of resources away from programs that have been reviewed by external panels and found to provide high quality, relevant scientific information to programs that have either not been reviewed, or have been reviewed and found to be of much lower scientific quality. One example of this pattern was a shift in resources away from CDFG's Bay Study Program to the Real-Time Monitoring Program. In the first case, the unique and exceptional data set provides an excellent resource for growing knowledge and testing assumptions about hydrology and species abundance and distribution because it covers so many different kinds of water years. In the case of Real-Time Monitoring, however, even IEP scientist are not entirely comfortable that collected data are effectively meeting the information needs of water managers. We understand that staff resources have been restored to the Bay Program, but this pattern of shifting resources from high quality information to efforts aimed at providing information at any cost serves to undermine both management needs, the relationship with science advisors, and the scientific credibility of entire programs.

The second pattern--which not only exists within IEP, but throughout the CALFED Program—is a general failure to allocate sufficient resources for evaluating program performance. It is impossible to conduct a scientific review without some kind of written document containing an analysis. But there are very few cases where enough staff time is allocated to compile and write the program syntheses that would enable scientific review. Instead, staff are moved from one program element to another as funding priorities shift and we learn very little about whether a course of action ever met the intended needs. In IEP's case, there is an established schedule for program reviews, but the schedule can not be adhered to because of these resource allocation patterns. If this continues, the result will be fewer programs actually being subject to scientific review despite IEP's goal of carrying these out.

*Administrative Impediments:* Contracting and the amount of staff time required to troubleshoot myriad and shifting contracting terms and requirements is a huge impediment to the conduct of science in the IEP. It hampers collaboration with outside entities and draws senior staff resources away from mentorship and management.

## **Opportunities and Program Review Recommendations**

The Science Program strongly supports IEP's efforts to enhance the scientific practices carried out throughout the program and recommends continued emphasis on publication, peer review, and partnerships with academic researchers. There are two specific recommendations that, if implemented, could go a long ways towards reducing or eliminating the impediments to the conduct of high quality science: establish a core group of senior research scientists in CDFG and remove the restrictions on out-of-state travel for state agency scientists traveling to scientific conferences.

*Establish Core Research Group in CDFG:* This year presents a unique opportunity to address some of the fundamental problems that impede scientific practices within the IEP. The Science Program is recommending that CDFG, which conducts the vast majority of IEP work, establish a core research group of PhD-level senior scientists using the new CALFED Science-CDFG positions approved for FY01/02.

The positions requested by CDFG to implement CALFED Science efforts were characterized as a field-based "strike team" that would respond to information requests about interactions between CALFED activities and Delta aquatic resources. Based on our programmatic review, however, we believe that another strike team would reinforce current program problems.

Instead, the Science Program recommends converting the new positions to 3 PhD-level senior scientist positions. These staff should have the responsibility for:

- conceptual design of experiments and collaborative investigations
- data analysis, interpretation, and publication
- mentorship and training of junior scientists
- organizing and conducting peer review of study plans and products; connecting CDFG scientists with those in the external research community working on similar issues; and
- should not include standard management duties

Such a new core research group would add a new organizational dimension that we believe would go a long way towards addressing some of the systemic weakness described above. Specifically, it would allow a small group of staff to work on the longer time horizon of science without affecting responsiveness to short-term needs, greatly increase the production of written reports, reinforce scientific practices, and enhance the credibility of IEP work in the broader research community.

If new classifications are needed, the Science Program will gladly provide information to CDFG and appropriate state staff on how similar groups of staff were designed in other institutions.

*Lift Restrictions on Participation by State Agency Scientists in Broader Research Community:*

The current administrative policy on limiting out-of-state travel has served to isolate agency scientists from the broader research community and must be changed to allow for travel to out-of-state conferences on a much more liberal basis. The current isolation has had far-reaching consequences. These include limiting the credibility work conducted by agency scientists (if it isn't peer reviewed externally, it isn't recognized as sound science regardless of the inherent merit of the work), limiting the extent to which research talent outside the state apply their skills and abilities to California's problems, and significantly affecting the ability of state scientists to stay current in their field. We strongly recommend that out-of-state-travel be defined and managed as ongoing and necessary duties of state scientists instead of a special and rare circumstance.

Scientists working within the federal IEP agencies do not have restrictions on travel to conferences beyond normal budgetary and supervisory controls.