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Dear Dr. Norgaard:

Thank you for the opportunity to provide input as the Delta Independent Science Board plans its approach for meeting the legislative requirement to provide oversight of the scientific research, monitoring, and assessment programs that support adaptive management of the Delta. We at the Sacramento Regional County Sanitation District (SRCSD) feel that this oversight responsibility is important, rightfully assigned to the Delta ISB, and we welcome the opportunity to contribute to its planning.

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The Delta has undergone significant changes since the 1849 gold rush precipitated a population influx to California that continues today. Human activities that include hydraulic gold mining, marshland and wetland reclamation, agriculture, water exports, invasive species introduction, and contamination from agricultural and urban runoff and from discharge of treated wastewater may have all contributed to changes in the Delta ecosystem. Most recently, ecosystem changes have resulted in a pelagic organism decline (POD) that has precipitated significant scientific effort to identify its causes.

We view the Delta ecosystem and the variety of stressors potentially impacting it as a puzzle made up of many pieces. Focusing efforts on assembling some of those pieces has revealed portions of the overall picture, but until all of the pieces can be assembled, that overall picture remains elusive. It is with this view of the Delta ecosystem in mind that we advocate ensuring that all potential stressors are thoroughly investigated. We believe that the Delta ISB is in a unique position to help ensure that research efforts are balanced and appropriate. Our oral presentation today and our written responses to your questions below support the themes of balanced, thorough research guided by the ISB to ensure delivery of the best scientific information and solutions to policymakers.

Responses to Delta Independent Science Board Questions

1. **In what ways do you feel Delta science is a) meeting the challenges of water and environmental management in the Delta, and/or b) not meeting these challenges?**

Delta science is being carried out by diverse groups of scientists, which has led to the identification and investigation of a wide variety of potential

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stressors. An overall coordination of scientific studies is lacking, however, which prevents prioritization of study topic areas or efficient allocation of scientific resources. This problem is exacerbated by research funders directing studies in topic areas that meet the research funding organizations' political objectives, rather than toward balancing research efforts across all stressors. At the end of the day, policymakers need unbiased scientific information upon which to base decisions and the current system is challenged to produce all of the information required to develop a clearer picture of Delta ecosystem challenges. Current and future scientific studies require coordination, synthesis of results, and integration using modeling tools to help identify and narrow knowledge gaps and to provide advice to policymakers based on best available science.

2. What factors have led to science being effective in addressing today's critical issues, and what factors have led to it being ineffective?

There is an acknowledged long list of environmental stressors impacting the Delta ecosystem. Investigators have pursued an understanding of many of these stressors through focused research in areas of interest and areas where research funding was available. This approach has led to a better understanding of some stressors and, in cases where research has been lacking, little additional understanding of others. Compounding the problem of research imbalance caused by lack of a research master plan for the Delta is deliberate skewing of research efforts to support a political position – a process referred to as “advocacy science” or “combat science.” Advocacy science reduces the effectiveness of science for providing unbiased information to policymakers. At this point, it is important for an independent group such as the Delta ISB, to step back, assess the knowledge and knowledge gaps, and re-focus research efforts on narrowing those knowledge gaps.

3. What are the emerging critical issues in the Delta that science will need to have addressed a decade from now?

Foremost, we, as a society, need to decide what type of Delta ecosystem is desired based on what type of ecosystem is achievable taking into consideration the irreversible historical changes and expected future changes beyond our control (e.g. climate change). Once that goal is established, policy can be directed toward meeting the goal. Other emerging critical issues:

- a. Defensible water quality objectives and flow criteria for the Delta are needed. The foundation for defensible objectives and criteria must be establishment of a desired type of Delta ecosystem and a thorough understanding of the effects of water quality and flow regimes on establishing and maintaining that desired type of ecosystem.
- b. The impact of flow regime modification on residence times in the Delta should be thoroughly examined. Residence time affects many Delta ecosystem functions, including food web, predation, invasive species proliferation, etc.
- c. Dr. Wim Kimmerer has demonstrated, through his studies, strong correlations between the introductions of various invasive species and step changes in native fish populations in the Delta. This correlation appears important and further study should be funded. We look to the ISB to identify and support study of works such as Dr. Kimmerer's invasive species studies because the work has the potential to identify contributing causes of the POD.

- d. Methylmercury contamination of benthic layers underlying the Delta estuary and of soils in areas slated for wetland and marshland restoration is a legacy of hydraulic gold mining. The methylmercury released by marshland and wetland restoration is bioaccumulative and is potentially harmful to wildlife and humans who consume the fish. Some Delta sport fish already contain mercury levels high enough to warrant warnings about human consumption. Future wetland and marshland restoration, acknowledged goals for improving the Delta ecosystem, will exacerbate the existing mercury accumulation problem in Delta fish.
- e. Pesticide residue contained in runoff from agricultural operations and from urban areas adds toxic contaminants to Delta waters. Influx of contaminants from these non-point sources is irregular and challenging to monitor and, as a result, doesn't receive the attention warranted by the impact it may cause. Research and regulatory resources are needed to accurately assess and mitigate the true impacts of these contamination sources.
- f. Development of effective ecosystem modeling tools to facilitate management of the system and to promote the understanding of the role of stressors on the food web, fish populations and other key ecosystem functions is needed.
- g. Improved knowledge of the role of entrainment losses and improved measures to minimize those losses at the South Delta pumping facilities is needed, given the planned, long term usage of those facilities.

4. What should we be doing now and over the next few years to ensure these scientific issues are addressed?

It is readily acknowledged that many stressors are impacting the Bay-Delta aquatic ecosystem and are potentially contributing to the pelagic organism decline (POD). The relative importance of the stressors, working independently or in concert, is a subject of unsettled scientific and political debate. Oversight of scientific research in the Delta is required to orchestrate the collective efforts of the investigators to produce the unbiased scientific information needed by policymakers to make policy decisions to best protect the Delta. A primary responsibility of the ISB must be to evaluate the relative scientific levels of effort that are being committed to the studies of all stressors to ensure that all receive appropriate attention. An example of that responsibility is the ISB's role in reviewing proposals for research support funded by the Delta Science Program. Through its influence on commitment of resources, the ISB can counteract imbalances in research efforts resulting from inevitable political and financial influences. The ISB can also contribute greatly to settling the debate about the relative importance of individual stressors and consortia of stressors by supporting development of robust Delta ecosystem modeling tools.

5. To what extent is poor or incomplete communication of science an issue in the Delta? How can and how should the communication of science be improved?

There is a lot at stake in making decisions about how much water can be exported from the Delta. Organizations with the most to lose by reductions in water exports recognized this early and began funding studies to identify stressors other than water exports. Political interests such as this skew the body of knowledge and the available information available to policymakers. Political interests also drive what information is communicated and how it is communicated. Biased communication will always be a part of the Delta equation because of the stakes. The Delta ISB can help bring balance to science communication by bringing balance to topics researched.

Improvements in communication of science can also be accomplished through clearer interagency communication among groups such as the ISB, the IEP, and the Delta Science Program. Interagency communication may be occurring, but it is not apparent to stakeholders whether coordination among the agencies is occurring and who has overarching authority on science issues.

- 6. Should separate and distinct roles be assigned to different sectors of the science community in the Delta (e.g., state agency scientists, academic scientists, NGO scientists, federal agency scientists, consulting firm scientists, water contractors, and municipal utility districts)? If so, what are these separate and distinct roles?**

All of the different sectors identified have the scientific capacity to study any topic area. What they choose to study is most often driven by the interests of their funders. No single organization is going to have the authority to assign specific research roles to different sectors. Rather, the Delta ISB can oversee study areas being pursued by the different sectors and through its Delta Science Program authority, ensure balance in Delta science research topics by funding research in areas not receiving necessary attention.

- 7. The legislature mandates the Delta ISB to review and assess science programs related to the Delta, covering each science program at least every four years. The Delta ISB would appreciate your advice on how to define a science program and which of the programs merit different levels of reviews.**

Science programs are probably best defined as any organization actively engaged in scientific research related to the Delta and producing information that contributes to the scientific body of knowledge about the impacts of human activity on the Delta ecosystem. This is a very broad definition, and obviously there is a long list of science programs ranging in size, capability, sophistication, funding, and areas of emphasis that would fit under this definition. Practically, the Delta ISB cannot review the work of every science program and project/study in detail, but it can assess the most important efforts.

One option is for the Delta ISB to assess science programs on a project/study basis. In this case the Delta ISB would track the projects/ studies that are going on in the many different forums and identify that which has the greatest potential to shape the scientific understanding of the Delta. Then the Delta ISB should take the time to critically review those projects/studies to make sure they properly add to the body of knowledge.

Another option is to review and audit at a program level. In this case the ISB would evaluate strengths and weakness of entire science programs. Larger science programs could be reviewed on a regular basis with small programs reviewed on an as needed or as requested basis. Areas to evaluate might be importance of project/study topics, qualifications and capabilities of personnel and facilities, the quality of peer review, and the potential for bias due to funding and predisposed views.

Other Issues and Concerns

There are two other areas where we would like to provide comment on important roles the Delta ISB can play in resolving Delta scientific issues:

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The Delta Plan is designed to adopt the Bay Delta Conservation Plan (BDCP) for incorporation into the Delta Plan, if it is consistent with the Delta Plan. Our concern is that the Delta Plan and the BDCP are being developed independently, with no apparent process in place to ensure that the finished plans end up being scientifically compatible. Each plan has its own development team and its own independent science oversight group. Our question is "what happens if the finished plans aren't scientifically compatible?" Our strong recommendation is for the ISB to provide scientific oversight of the science being used to develop the BDCP and to wield its influence with the Delta Stewardship Council, with the specific goal of ensuring that the development efforts for both plans have the specific goal of ensuring their compatibility and common threads in terms of the scientific approach.

The 2010/2011 winter provided an abundance of snowpack that resulted in relatively high water flows through the Delta and into San Francisco Bay and the Pacific Ocean. Algal blooms in Suisun Bay and fish counts throughout the Delta rebounded as a result of the additional water in the system. This appears to be a strong indication that the Delta is a robust system when water is allowed to flow through it rather than being diverted from it. We think it is critically important to apply resources to study episodic events such as high flow years and look to the ISB to facilitate funding to ensure opportunities to study episodic events aren't missed.

The SRCSD is committed to achieving a healthy Delta ecosystem and we welcome this opportunity to participate in plans to utilize scientific knowledge to guide policy decisions to improve the Delta.

Sincerely,



Stan Dean
District Engineer