

## DRAFT QUESTIONS FOR ERPP SCIENTIFIC REVIEW PANEL

### Purpose of Questions to be Addressed by the Scientific Review Panel

The objective of the Scientific Review Panel is to provide advice and recommendations on some of the key issues surrounding development of the Ecosystem Restoration Program Plan (ERPP). Questions developed to guide the discussion will focus in two primary areas: 1) evaluation of the scientific validity of the basic concepts and assumptions upon which the ERPP is based; and 2) development of advice and recommendations based on real-life experiences from other restoration programs which may serve to improve the ERPP.

Since it would be very difficult to expect scientists unfamiliar with the Bay-Delta system and its unique problems to review the entire ERPP document with multiple targets and actions and provide a meaningful review in a short time period, the questions will focus on conceptual issues of basic scientific theories and principles, ecological restoration and environmental planning. The questions will not require the Scientific Review Panel to analyze technical data nor have specific prerequisite knowledge of the problems in the Bay-Delta system. The questions are intended to challenge the Panel to draw upon personal experiences gained from working in other ecological systems and to apply general scientific concepts in making recommendations for the ERPP. The questions have been separated into several general categories to ensure that all aspects of the ERPP are incorporated into the review.

### Overview of the Ecosystem Restoration Program Plan

The Ecosystem Restoration Program Plan's goal for ecosystem quality is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. The foundation of the ERPP is restoration of ecological processes that are associated with streamflow, stream channels, watersheds, and floodplains. These processes create and maintain habitats essential to the life history of species dependent on the Delta.

The ERPP employs an integrated systems approach that aims to reverse the fundamental causes of decline in fish and wildlife populations. A systems approach will recognize the natural forces that created historic habitats and use these forces to help regenerate habitats. The Bay-Delta ecosystem is a complex living system sustained by

innumerable interactions that are physical, climatic, chemical, and biological in nature, both within and outside of the geographic boundaries of the Delta. The central theme of the ERPP is the recognition that truly durable and resilient populations of all fish and wildlife inhabiting the Bay and Delta require, above all else, the rehabilitation of ecological processes throughout the Central Valley river and estuary systems and watersheds.

*Questions regarding the planning process of the ERPP.*

The goal of the Ecosystem Restoration Program Plan is to restore ecological health to the Bay-Delta ecosystem through implementation of multiple actions embodied in the implementation objectives. The ERPP attempts to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species.

The ERPP proposes to achieve these goals by utilizing a planning approach which guides the realization of conceptual goals into actions. The planning approach of the ERPP includes development of the following:

- *Visions* - statements of what the ERPP seeks to accomplish with the objectives, targets, and programmatic actions;
- *Implementation Objectives* - specific, detailed descriptions of what the ERPP strives to maintain or achieve;
- *Targets* - qualitative or quantitative statements of the implementation objectives; and
- *Programmatic Actions* - physical, operational, legal, or institutional change or alternative means to achieve a target. Numerous site-specific actions will be implemented to fulfill the programmatic actions.

1. **Is the general planning approach described in the ERPP appropriate and adequate?**
2. **How does this approach differ from other restoration efforts with which you are familiar? What lessons can be learned from other restoration programs? Are there elements of the ERPP planning approach that are unnecessary? Are there elements missing that can improve the process?**

*Questions regarding targets of ecosystem health.*

A target is a qualitative or quantitative statement of an implementation objective. Targets are something to strive for but may change over the life of the program with new

information and progress, or may vary according to the configuration of storage and conveyance in all alternatives. Targets may include a range of values or a narrative description of the proposed future value of an ecosystem element.

The intent of the ERPP is to restore ecosystem health by achieving the implementation objectives; targets are flexible tools to guide the effort. The level of implementation for each target will be determined or adjusted through adaptive management.

In developing restoration targets, three different approaches were utilized: 1) historical pre-disturbance conditions; 2) diagnostic and prescriptive indicators; and 3) historical reference period incorporating existing disturbances conditions. The first approach sets targets based on historical pre-disturbance reference conditions. A limitation to this approach is that appropriate reference periods are difficult to select, and in many cases existing conditions have been altered so drastically that restoration to a pre-disturbance condition is infeasible. The second perspective involves setting diagnostic goals to define how the ecosystem should function; identification of diagnostic indicators, implementation of prescriptive measures to achieve the diagnostic goals, and identification of prescriptive indicators. The third approach sets targets based on recent reference periods with healthy ecosystem conditions that supported substantial populations of target species.

**3. Based on your experience, is this a reasonable method for setting restoration targets?**

*Questions regarding the scope of the ERPP.*

The CALFED Programmatic EIR/EIS identifies a geographic problem scope which addresses the problems that exist in the legally defined Delta or are closely linked to this area. Because the Bay-Delta solution is part of a larger resource system, a much broader geographic solution scope has been defined.

In order to address ecological problems manifest in the Delta or closely linked to the Delta, the ERPP proposes implementation objectives within ecological zones which are defined by the Bay-Delta, the Sacramento River, the San Joaquin River, and their tributary watersheds below major dams and reservoirs. The ecological zones represent the regions where there are strong linkages among the processes, functions, habitats and species affecting ecological health of the Delta. The ERPP addresses several processes affecting water quality and quantity in the tributary watersheds outside of the ecological zones.

- 4. Can and under what circumstances may restoration of ecological processes in the uppermost areas of tributary watersheds and other areas outside of the ecological zones result in measurable benefits in the tributaries to the Delta and the Delta itself?**

*Questions regarding the process of adaptive management.*

Information regarding causes and solutions related to restoration of ecological health of the Bay-Delta system is in many cases incomplete or unknown. The difficulties and uncertainties of ecosystem restoration call for an implementation strategy that is flexible and can accommodate and respond to new information. The foundation of the ERPP implementation strategy is adaptive management. Adaptive management is a process of testing alternative ways of meeting objectives and adapting future management actions according to what is learned. Adaptive management involves implementing the actions most likely to achieve ecosystem management goals given the existing state of knowledge. The ERPP has proposed an approach to adaptive management which includes identification of indicators of ecosystem health, comprehensive monitoring of indicators to measure improvement over time, focused research, and phasing of actions.

- 5. Is the general adaptive management approach described in the ERPP appropriate and adequate?**
- 6. How does this approach differ from other adaptive management efforts, and what lessons can be learned? Are there elements of the adaptive management process of the ERPP that are unnecessary? Are there elements missing that can improve the process?**

*Questions regarding the process of phasing.*

Phasing is the logical sequence of implementing restoration actions to achieve CALFED goals as effectively as possible. Early phases of the program will include restoration of ecological processes and habitats that are most important for endangered species recovery, reduction of stressors that affect threatened and endangered species, and other actions that may reduce conflicts between beneficial uses in the system. As restoration progresses and threats to endangered species are reduced or eliminated, restoration efforts will expand work toward the broader issue focus of restoring ecological health.

The balancing and priority for implementation and funding of ecosystem recovery projects will be based on a hierarchy designed to ensure the greatest level of ecosystem

resilience against future disturbance, and to support self-sustaining populations that require the least amount of human intervention possible.

The phased implementation program proposes:

- short-term implementation of ecosystem restoration demonstration projects (e.g., through Category III and related programs), including stressor reduction measures, to help threatened populations begin recovering and to test the viability and effectiveness of targets and actions,
- coordinated monitoring, evaluation, and reporting of the results of recovery efforts, and the status of ecological indicators in the Bay-Delta and other zones, and
- adaptive management of each successive phase of ERPP implementation, including pragmatic adjustments to ecosystem targets, funding priorities, and restoration techniques to ensure that public and private resources are well spent and complement other related efforts.

**7. Can you comment on our approach or recommend a method to achieve a proper balance in implementing actions?**

**8. Based on your experience and review of the ERPP implementation objectives, is the process of phased implementation described in the ERPP appropriate and adequate? Would you recommend additional steps to help refine the process of phasing?**

*Questions regarding indicators of ecosystem health.*

A comprehensive suite of indicators is essential to:

- explicitly translate broad goals into measurable performance parameters that encompass most or all of the significant characteristics of the ecological system;
- decrease the dependence of the definition of success of the program onto any single indicator; and
- provide guiding information for long-term adaptive management strategies.

The ERPP uses a suite of indicators to track the effectiveness of the implementation objectives and assess ecological performance at several ecological scales. Indicators are direct measures of ecosystem performance for each parameter identified in the implementation objectives. The ERPP describes each indicator with a metric (what will be measured) and how the metric relates to the implementation objective parameter.

- 9. Will the suite of indicators identified in the ERPP effectively evaluate whether the implementation objectives are being met? Is the suite of indicators sufficiently inclusive to effectively evaluate ecosystem health?**

*Questions regarding the outcomes of the ERPP.*

The Bay-Delta ecosystem has undergone substantial irreversible changes caused by anthropogenic actions. The changes include destruction or degradation of habitats, alteration of the hydrologic regime, introduction of exotic species, chemical contamination, and other problems.

- 10. Do the irreversible changes in the Bay-Delta suggest that the implementation objectives are reasonable? What irreversible changes have occurred in other systems, and how have those affected restoration efforts?**
- 11. How can you quantify the flow characteristics (including frequency of occurrence, length of duration, quantity of discharge, etc.) of the hydrograph that serve to support basic ecological processes and functions? Would these be applicable to the Bay-Delta ecosystem?**
- 12. Multiple types of actions will be needed to achieve the implementation goals. The outcomes of multiple types of actions may conflict with each other and cause secondary effects. In your experience, what kinds of unexpected consequences might result from multiple actions? Alternatively, does the ERPP combine multiple actions to optimize synergistic benefits?**
- 13. Does the ERPP identify and incorporate all of the requirements necessary for implementation of a successful long-term restoration program?**