

PROSPECTUS

EVALUATION OF A TRANSITION IN THE ROLES OF SCIENCE AND MANAGEMENT DURING THE EVOLUTION OF ADAPTIVE MANAGEMENT PROGRAMS

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INTRODUCTION

The Glen Canyon Dam Adaptive Management Program (GCDAMP) was established to implement requirements of the 1992 Grand Canyon Protection Act and Glen Canyon Dam EIS as follows: “Operate Glen Canyon Dam and exercise other authorities in such a manner as to protect, mitigate adverse impacts to and improve values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including but not limited to natural and cultural resources and visitor use, and subject to water allocation and development provisions of existing statutes and laws (GCPA, 1992).” The EIS commits the Secretary to, “Initiate a process of adaptive management whereby the effects of dam operations on downstream resources would be assessed and the results of those resource assessments would form the basis for future modifications of dam operations. The concept of adaptive management is based on the recognized need for operational flexibility to respond to future monitoring and research findings (GCDEIS 1996)”.

One area identified as needing improvement in the GCDAMP involves determining when science has sufficiently reduced uncertainty regarding outcomes from a proposed activity, so that policy makers and managers can define a management action that would require limited future science activity, presumably subject to long term monitoring, but not further research. This relationship between research and management presumes a level of stasis in the ecosystem and continuity in cause and effect relationships between actions undertaken and resource responses. Management actions are not explicitly defined by the GCDAMP, and the term is used synonymously with experiments in the adaptive management literature, but the GCDAMP web site www.usbr.gov/uc/rm/amp/amwg includes the following two statements related to management actions (emphasis added):

- *The scientific information obtained under the Adaptive Management Program is used as the basis for recommendations for dam operations and management actions.*
- *Through the Adaptive Management approach, scientific experimentation is integrated into resource management actions. Over time, as more is learned about the complexities of the downstream ecosystem, the goal of enhancing and improving downstream resources and dam operations can be realized.*

Information developed by the Technical Work Group (TWG) and other GCDAMP entities includes the following discussions on management actions. The concept of management actions was brought forward in development of a Long-Term Experimental Plan (LTEP during deliberations of the Science Planning Group (an AMWG ad hoc group) in 2005 through 2006. Management actions were contrasted with

experiments in the development of an experimental design for an LTEP. That design was designated the “hybrid” design because it accommodated both experiments and management actions. Definitions used at that time held that both experiments and management actions are purposeful manipulations of the system flow or nonflow treatments. Defined management actions were considered to have known, positive effects, however, and therefore would be implemented and maintained as needed to attain the desired resource conditions. By contrast, experimental actions were defined as having more uncertain effects and would be purposefully turned on and off, or implemented in different states, as treatments to determine their effects.

Neither the Strategic Plan nor any of the other guiding documents in the GCDAMP clearly describe what management actions are, how they should be developed in relation to science, or what funding should be used to implement them. For example, there is a critical need to implement compliance activities within the program, but there is uncertainty as to whether they should be treated as management actions or science experiments.

In developing the FY 2010-11 workplans and budgets, it has become clear that the GCDAMP should consider the implications of management actions. An example is the mechanical non-native fish removal project along the mainstem, which, as a compliance measure could be implemented as a management action, scientific research, or a hybrid of the two depending on the presumed certainty of its outcome, whether it is being used to test hypotheses, and whether its application has been fully tested under research and development. The removal program was included in a 2008 Biological Opinion issued by the US Fish and Wildlife Service as a necessary conservation measure. The science entity (GCMRC) has completed its charge of assessing protocols for achieving desired levels of coldwater species (specifically rainbow trout (RBT)) control, but there remain critical questions concerning the relationship between nonnative fish removal and the response of native fish, including the endangered humpback chub, as well as questions about the origin of the trout and where removal efforts would be most effective (tributaries versus mainstem). Trout removal could be implemented as a management action following the completion of technique development, but the desired level of certainty in outcome regarding resource responses is unknown. Following the recommendations of a panel of scientists in April 2007, the approach to determine whether the control of RBT has positive (or possibly even negative) effects on HBC was terminated. As such, if coldwater species control (specifically, nonnative salmonids) is continued, should it be continued as a management action, science program, compliance activity or some combination (hybrid)?

Fundamental questions arise from the above and other examples in the GCDAMP.

- What does it mean in adaptive management programs to move from scientific experimental research to management actions?
- Can we learn from examples of other adaptive management programs?
- How is the decision made to evaluate and adopt or reject proposed management actions?
- What is the process to evaluate and adopt or reject proposed management actions?
- What are the important considerations in defining criteria for management actions?

- Do management actions fall on a continuum of how much “science” is involved in their implementation and monitoring?
- Where does monitoring fit?
- Do management actions fall on a continuum of how much “science” is involved in their implementation and monitoring?
- What are the important considerations in defining criteria for management actions?
- How do we determine who is responsible for funding and implementation?
- Can we learn from examples of other adaptive management programs?

These questions will be investigated by TWG with the support of the Science Advisors (SAs) and the GCMRC to make technical recommendations to AMWG. The first step will involve the SAs evaluation of examples of the transition from science to management actions in other programs. It is intended to provide a starting point of conversation for discussions by the Secretary’s Designee, AMWG and TWG.

REQUESTED SCIENCE ADVISOR INPUT TO GCDAMP

The following motion was passed by consensus of the AMWG on August 13, 2009 reflecting their desire to continue to develop information on this issue: “The AMWG requests that the SAs survey other adaptive management programs and develop a report which describes their definitions of criteria for defining science-based management actions and the transition from research to management. The report should be provided to the TWG and AMWG members, and TWG should review the report and forward to AMWG options for AMWG to consider with regard to how GCDAMP should handle these issues.”

SA PROCEDURE TO RESPOND TO AMWG REQUEST

This prospectus describes the SA’s approach for responding to the AMWG’s request. The SAs, in keeping with their operating protocols, will only address issues of a scientific and technical nature. The SAs protocol and operating procedures do not permit assessments of policy or legal interpretations of USDOJ decision processes, or decision processes of the GCDAMP FACA committee. The request by the AMWG asks for a survey of information from other programs that utilize adaptive management or similar processes and have implemented management actions or similar practices. This request is an activity that conforms to SA protocols.

The SA charge for this specific project will be confined generally to the following objective. **The SAs will:**

- (a) survey scientific literature on adaptive management for uses of the term “management actions” and ascertain definitions of this term relative to research and monitoring in the evolution of adaptive management programs**
- (b) survey federal and state adaptive management and related programs and gather information on how these programs managed a transition from science inquiry to management actions or similar practices on specific issues, projects or activities, and**

(c) based on that survey identify criteria or guidelines that can assist scientists, managers and stakeholders to successfully transition across the roles of science and management actions in the evolution of adaptive management.

The project is not intended to create an explicit definition for either a science activity or a “management action”. Nor is it intended to determine when GCDAMP science programs should be transitioned to management actions or similar activities. However, it should provide information to the Secretary, GCDAMP managers and stakeholders to assist in this determination.

The general approach taken for information development will be a case study methodology. Cases will be selected that have similar characteristics to the GCDAMP as follows:

- Federal and/or state directed programs
- Use adaptive management or similar processes
- Long term programs with legal, policy, or regulatory authorities to resolve landscape level issues involving natural resource and social resource conflicts
- The use of science to reduce uncertainty of related impacts from management activities is a significant program thrust
- Implementing management actions to improve appropriate protection and or management of natural and cultural resources is a significant program thrust
- Sufficient science success exists in reducing the uncertainty of outcomes of management activities to define when additional investments in science unnecessary or limited
- Defined needs have been identified to transition to management actions or activities with reduced science need.

In addition, the Department of the Interior’s 2007 technical guide for adaptive management will be revisited for any guidance it may contain relating to the subject of transitioning from scientific experimental research of ecosystems to approval and implementation of management actions. Particular attention will be focused on identifying relevant guidance provided in Chapter 5, entitled *Other Operational Issues*, including sections 5.1. *Uses of Information in Natural Resource Management*, 5.2. *Accounting for Uncertainty in Adaptive Management* and 5.3. *The Measurement of Learning*. Several of the case studies included in the DOI technical guide will also be reviewed (as listed below) for evidence of transitions between scientific studies and management actions. Lead authors engaged in the revision of the technical guide will be queried for their findings relative to the questions being addressed in the SA study.

There are many federal and state directed natural resource programs that use elements of adaptive management processes. Some programs have fully developed science and management programs that are explicitly structured to conduct policy experiments and transition to fully informed management actions from their science investigations. Our survey will screen a set of programs and focus on those that have similar characteristics to the GCDAMP program, i.e. developed science and management programs conducting on going policy experiments.

A cross section of adaptive management programs will be evaluated to isolate subsets that reflect accomplishment in implementing management actions or where uncertainty in outcomes was reduced and management actions were adopted. Criteria will be applied to ensure comparability across programs and their relatedness to the

GCDAMP. An effort will be extended to incorporate programs that are focused on providing the science and management basis for recovery of endangered fish in western riverine settings.

Following are examples of programs that may be screened in the assessment.

- Trout Creek Mountains Restoration, U.S. Department of the Interior, Bureau of Land Management, Vale District, and the U.S. Fish and Wildlife Service
- Adaptive Waterfowl Harvest Management; USDI/FWS
- Sonoita Valley Planning Partnership, Bureau of Land Management-Tucson Field Office, U.S. Fish and Wildlife Service-Arizona Ecological Services, Coronado National Forest, Natural Resource Conservation Services, Colorado
- Bully Creek Landscape Area Management Project; U.S. Department of the Interior, Bureau of Land Management, Vale District,
- Interagency Bison Management Plan; National Park Service, Yellowstone National Park,
- Ponderosa Pine Forest Restoration on Turnbull; U.S. Fish and Wildlife Service,
- Five Rivers Landscape Management Project; U.S. Department of Agriculture, U.S. Forest Service,
- Kissimmee River; Florida
- Columbia River; PNW
- Cal-Fed; California
- Adaptive Fisheries Harvest; Northwest
- Platte River; Wyoming/Colorado/Nebraska
- Trinity River; California
- South Florida Restoration Task Force; Florida
- Northwest Forest Plan; PNW
- Northeastern States Research Cooperative
- Lower Colorado River Multi-Species Conservation Program; SW
- Tahoe Science Consortium
- Chesapeake Bay Program
- Upper Colorado River Recovery Implementation Program
- San Juan River Recovery Implementation Program
- Bridge River of British Columbia - flow experiments and BC Hydro operational strategies,
- Bill Williams River, AZ– operational strategies for Alamo Dam
- Vernalis Adaptive Management Program, USFWS, California
- Missouri River Recovery Program (MRRP), USFWS and USACE
- Bay Delta Conservation Plan, California
- Comprehensive Everglades Restoration Plan (CERP) Adaptive Management Program

Several case studies within the Colorado River Basin may also be of particular relevance to the issue of how management actions (primarily, daily to annual release strategies, but other treatments also) have been recently implemented as DOI policies: 1) scientific basis for MLFF rules for Glen Canyon Dam operations approved as ROD in 1996, 2) scientific information used as basis for current Flaming Gorge Dam operations on the Green River under the ROD implemented in 2006, 3) scientific basis for Navajo

Dam operations on the San Juan River under current ROD, 4) scientific basis for proposed Aspinall Unit operations on the Gunnison and Colorado Rivers in anticipation of future ROD. In each case, we assume that the management actions are implemented on the basis of scientific information and other legal mandates intended to achieve specified resource objectives. The question remains: “How were the current operating policies at the above facilities identified and then transitioned from the focus of research evaluation to management actions?”

The survey and case study assessments will be directed at identifying (1) several specific examples where activities have transitioned from science to management, and (2) criteria, guidelines, processes, and other information that could be helpful to GCDAMP managers in identifying management actions with sufficiently known effects and certainty in predicted outcomes that they no longer require significant science investments. The need for certainty in implementing management actions has its basis in several areas of science, however, the SAs also recognize that there is wide variation among managers and policy makers in their risk tolerance for making management decisions. Criteria and guidelines can be developed to assist managers and policy makers in understanding general levels of certainty that are associated with taking management actions. And, case studies can be very helpful in demonstrating the workability of these criteria and guidelines.

In the end, defining when a specific management action requires or does not require additional investments in research and monitoring to further reduce uncertainty is a management decision. And, an organization’s or manager’s willingness to accept risk varies with many factors, including time, issue, social and environmental conditions, the management action under consideration and its effect, cost, certainty of effect, etc. Much of the process, therefore, is greatly influenced by value judgments and willingness to take risk.

REQUIREMENT AND SCHEDULE

The SAs approach will involve three primary steps in the fall 2009 as follows:

- Evaluation of science literature for specific findings that can contribute criteria, guidelines, models and information to clarify opportunities for movement from a science activity to a management action.
- Screen 20 to 30 adaptive management programs, and select an appropriate subset (5-10) to evaluate as case studies.
- Based on the case studies, identify criteria, processes, guidelines, models, information, management experience, and other tools that may assist managers in moving from science to management actions.

The SAs will complete the above assessments from September 15, 2009-December 15, 2009. A report of findings of the SAs will be submitted to GCMRC and the TWG by December 21, 2009. The SAs Executive Coordinator will present their findings to the TWG at their January 2010 meeting and to the AMWG at their spring 2010 meeting.