

DOING RESEARCH IN THE GRAND CANYON



GRAND CANYON
MONITORING AND
RESEARCH CENTER

GRAND CANYON MONITORING AND RESEARCH CENTER
US DEPARTMENT OF THE INTERIOR
FLAGSTAFF, AZ



**GUIDELINES FOR
THE GRAND CANYON MONITORING AND RESEARCH CENTER¹
US DEPARTMENT OF THE INTERIOR
OFFICE OF THE ASSISTANT SECRETARY FOR WATER AND SCIENCE**

EXECUTIVE SUMMARY

This document specifies guidelines for organization and administration of both short and long-term monitoring and research programs called for in the Grand Canyon Protection Act (1992). The monitoring and research program focuses on resources affected by Glen Canyon dam operations within Grand Canyon National Park and Glen Canyon National Recreation Area.

The science unit, entitled the Grand Canyon Monitoring and Research Center (GCMRC), is established initially within the Office of the Assistant Secretary for Water and Science, United States Department of Interior (USDOI). Research Center programs will be directed by a Center Chief and will focus on management objectives and science information needs identified by an Adaptive Management Work Group and its Technical Work Group.

In addition to the Chief, the Research Center will be staffed by three scientists/program managers and an information transfer specialist who will work to implement defined monitoring, research and information archiving and transfer needs and Native American program coordination in collaboration with colleagues from other federal and state agencies, Native American tribes, universities and the private sector. The Center's monitoring and research programs will be conducted under open Call for Proposal (CFP) processes, in which projects will be selected on the basis of applicability to defined monitoring and research needs, creativity, and scientific merit. Memoranda of Agreement, cooperative agreements, interagency agreements and other administrative mechanisms may also be used to conduct monitoring and research programming.

¹ This document was developed as a cooperative effort in 1996 by members of the Transition Work Group and the Grand Canyon Monitoring and Research Center, L. D. Garret, Center Chief.

INTRODUCTION

The Colorado River has created over the eons one of nature's most spectacular landscapes—The Grand Canyon. Since 1963, many resources in Glen, Marble and Grand Canyons have been altered by placement of Glen Canyon Dam. Specifically, the generation of electricity by variable release of water through the Dam's power plant has significantly altered daily flow regimes of the Colorado River from its original range of variation. Physical and chemical changes in river flows have led to other changes in riverine and associated riparian environments and the organisms that depend upon these environments.

The Grand Canyon Protection Act of 1992 (GCPA) (PL 102-575), directs the Secretary of Interior *"to establish and implement long-term monitoring programs and activities that will ensure that Glen Canyon Dam is operated in a manner consistent with that of Section 1802"* of the GCPA. Long-term monitoring of Glen Canyon Dam shall include any necessary research and studies to determine the effects of the Secretary's actions under Section 1804(c) of the law on the natural recreational, and cultural resources of Grand Canyon National Park and Glen Canyon National Recreation Area. The monitoring information is necessary *"to protect, mitigate adverse impacts to, and improve the 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"*.

The Secretary's actions shall be *"in a manner fully consistent with and subject to the Colorado River Compact, the upper Colorado River Basin Compact, the Treaty of 1944 with Mexico, the decree of the Supreme Court in Arizona v. California and the provisions of the Colorado River Storage Project Act of 1968 that govern allocation, appropriation, development, and exploration of the waters of the Colorado River Basin."* Actions of the Secretary will also be consistent with all other federal and state laws relating to resources, federal, tribal, state, and local interests.

ORGANIZATIONAL STRUCTURE AND MISSION

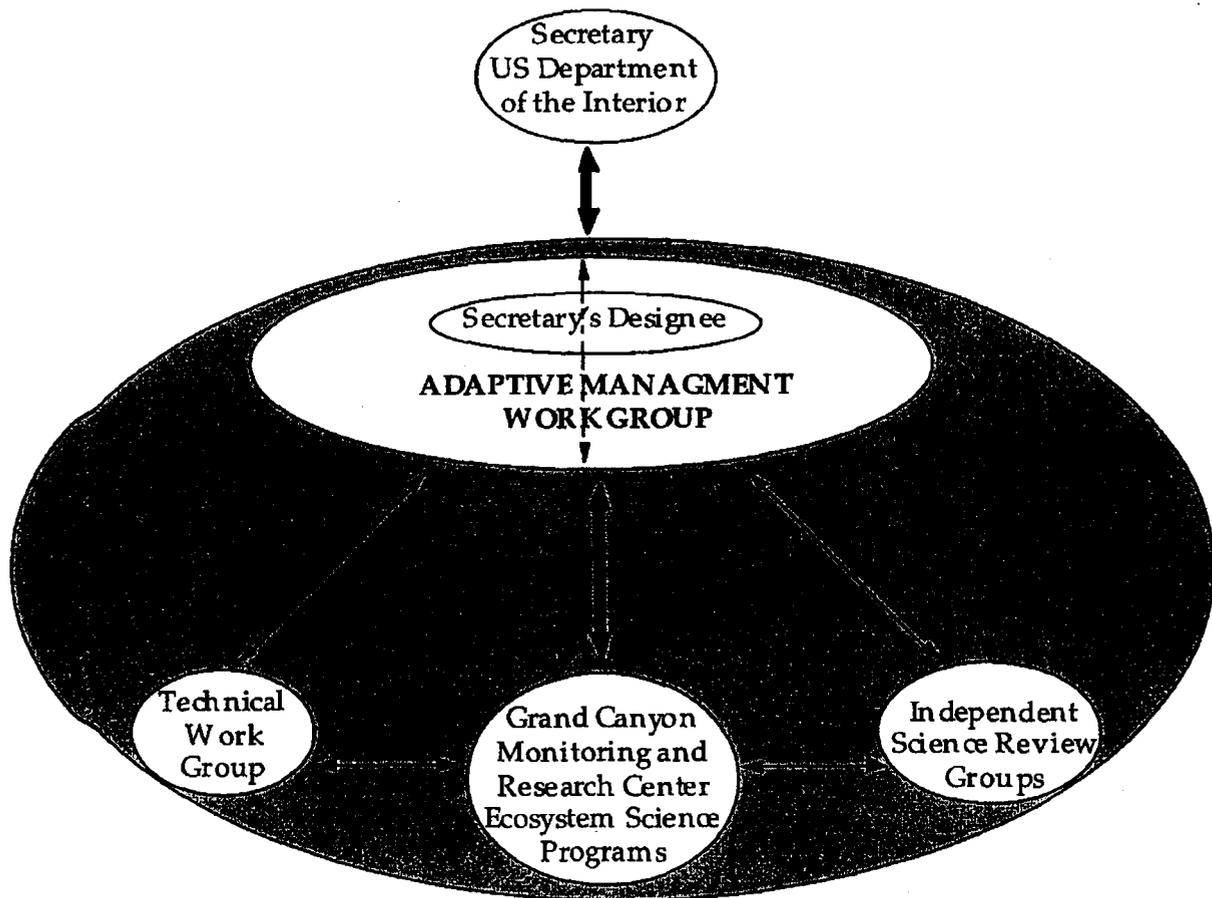
The Environmental Impact Statement (EIS) for future operation of the Glen Canyon Dam calls for establishment of an Adaptive Management Program for assessment of Glen Canyon Dam alternative operating criteria defined in the record of decision. The EIS specifies establishment of a monitoring and research center within the Adaptive Management Program. The EIS defines the Adaptive Management Program as a new approach in USDOl management direction, which includes federal and state resource management agencies, Native American tribes, and a diverse set of other private and public stakeholders in the decision process. The decision and management process is constantly evolving, with continuous input of new information and science from a research center.

Figure 1 contains a schematic of the Adaptive Management Program and its critical entities, including the Research Center, now designated as the Grand Canyon Monitoring and Research Center. Following are the defined roles for the research center and other specified entities.

- **Grand Canyon Monitoring and Research Center (GCMRC):** To conduct short and long-term ecosystem monitoring and research programs of alternative dam operation criteria and other information needs specified by the Adaptive Management Work Group (AMWG). To evaluate ecosystem resource impacts and changes resulting from alternative dam operating criteria to physical, aquatic, terrestrial and cultural resources in the river corridor. To inform the Adaptive Management Work Group of resource protection, management and use implications of alternative dam operating criteria.
- **Secretary of the Interior/Assistant Secretary for Water and Science/Designee:** To assure that Glen Canyon Dam operations criteria provide appropriate protection, management and use of Grand Canyon National Park and Glen Canyon Recreation Area resources, as supported by scientific assessment.

- **Adaptive Management Work Group (AMWG):** To provide to the Research Center defined stakeholder objectives and criteria: To provide to the Secretary of Interior appropriate recommendations on operation criteria for the Glen Canyon Dam.
- **Technical Work Group (TWG):** To articulate to the Research Center the science and information needs expressed in the objectives defined by the AMWG.
- **Independent Science Review Groups:** To provide independent science assessments of proposed research plans and programs, technical reports and publications and other program accomplishments of the research Center.

Figure 1: Adaptive Management Program Schematic



The mission of the Grand Canyon Monitoring and Research Center is to operate within the Adaptive Management Program and with the AMWG/TWG to develop and implement scientifically sound monitoring, research and information archiving and transfer programs for the Colorado River and associated resources within Glen Canyon National Recreation Area (NRA) and Grand Canyon National Park (NP). Monitoring and research programs developed by the Center will respond to science needs related to the short and long term operation of the Glen Canyon Dam as specified in the GCPA and Glen Canyon Dam EIS.

The Adaptive Management Program Charter will guide relationships of the Center to the AMWG and Independent Science Review Groups. As prescribed in the Glen Canyon Dam EIS, the Center's monitoring and research programs are to respond to research needs specified by the USDOJ Secretary appointed AMWG, a FACA committee.

THE ROLE OF SCIENCE

The Research Center is to oversee the conduct of scientifically rigorous investigations in response to adaptive management, stakeholder and landowner needs based on prioritized management objectives determined by the AMWG. Relevant scientific information is needed for the proper stewardship of the Colorado River ecosystem and related resources within Glen Canyon National (NRA) and Grand Canyon NP. Science is clearly a powerful mechanism to learn about natural processes for prioritizing outcomes of management actions associated with uncertainty and risk, and for recognizing significant outcomes from unexpected responses. Science can be used to provide critical information and technology to managers and stakeholders so they can better define management, protection and use practices appropriate to both dam operations and management of physical, biotic, cultural and human resources in the Canyon.

The Center will integrate research and monitoring information from past Glen Canyon Environmental Studies and new Center studies into assessments of dam operation

criteria. All new Center research programs will adopt ecosystem science approaches which will require integrated resource science assessments across space and time. These techniques are well documented in both scientific and management literature as progressive methods for advancing both science and management capabilities, while supporting enhanced protection, management and use of natural resources.

The scientific program will consist of three broad elements; Long-Term Monitoring, Research and Information Archiving and Transfer. All of these areas will have representative programming in differing Native American cultures.

The existing National Research Council reviewed Long-Term Monitoring and Research Plan (LTP) will be redrafted by the Chief of the Center with input from the AMWG, the TWG and a broad cross section of agency, tribal, university and private sector scientists. The LTP will be reviewed by Independent Science Review Groups and approved by the Assistant Secretary for Water and Science, USDOl.

Long-term monitoring

The purpose of both short and long-term monitoring is to detect and project both expected and unexpected changes in this ecosystem, especially on a longer term (decade/century) time scale, as related to defining dam operation criteria. Other more management related purposes of monitoring are to establish current baseline conditions for resources and determine the effects of differing management alternatives on these historical baselines. This portion of the program is expected to be relatively stable, dependent upon consistent methodologies, and modified only after in depth evaluations. Prior to implementation of monitoring procedures, specific protocols will be developed and reviewed for scientific credibility. Maintaining programs and procedures will be reviewed every three years. Maintenance of long-term databases is an essential element of the monitoring program. ←

Monitoring activities will be developed through selection processes that includes open call for proposals, open competition and cooperative agreements. All studies implemented will include panel and peer review of proposals, and Center consultation with the Technical Work Group. Criteria for selection of differing proposals will include support of management information needs, scientific merit, and cost effectiveness. Approved monitoring programs and administrative support will be funded by power revenues from the Colorado River Storage Project.

All monitoring data sets will be accessible to outside investigators and interested parties through developed information and technology services, except for selected sensitive data restricted by law, such as information on endangered species, cultural resource locations and proprietary information such as utility rate structures. All maps, databases, archiving and retrieval procedures will conform to federal standards.

Monitoring priorities will be set cooperatively by the Research Center with the AMWG. However, some programs may of necessity require special schedule adjustments. These include, for example, defined monitoring activities for the biological opinion (endangered species) and programmatic agreement (cultural resources), which require development of more detailed protocol to capture appropriate authorities and responsibilities.

Research

The purpose of the research program is to interpret and explain trends observed from monitoring, to determine cause and effect relationships and to better define interrelationships among physical, biological, and social processes. Research will play an important role in development of integrated methods of monitoring, prediction of key physical and biological processes, definition of resource interaction, and development of ecosystem models. Research will be founded in the scientific method, especially ecosystem science paradigms. However, other appropriate

techniques may be used to evaluate traditional and cultural values.

Research priorities will be assigned through assessments by the Research Center in cooperation with the AMWG. As noted, research and monitoring activities called for in the biological opinion (endangered species) and programmatic agreement (cultural resources) may require special schedule accommodations.

Research programs will be conducted through open Call for Proposal (CFP) and cooperative programming processes, through which research projects are selected on the basis of scientific merit support of management research information needs, and cost effectiveness. All research study proposals will receive panel and peer reviews. ←

Coordination and oversight of the monitoring and research programs will be provided by the Center Chief and science staff. An important element of the oversight will be synthesis of knowledge and ecosystem level assessments. These approaches will assure integration is made among the physical, biological and human science components of the program.

Information Archiving and Transfer

A third critical part of Research Center programming is information archiving and transfer to managers and stakeholders, including representatives of the NPS, BOR, FWS, Native American tribes, associated state resource agencies, and a broad cross section of other non-government and non-management entities. The Research Center views this part of the science program as critical to realizing the full benefit and power of the Adaptive Management Program.

Information archiving will be based on collection of information from monitoring and research projects under prescribed protocols, including, but not limited to, electronic, written, photographic, and video format. New archived information will be added to information previously archived under Glen Canyon Environmental

Studies, with metadata collected for each research and monitoring element. Selected information will be archived and available only to specific parties. For example, restricted data access protocol will be developed as regards to proprietary information and location of cultural resources and endangered species.

Information transfer programs will utilize a broad array of methods to bring monitoring and science information to users. This will include computer access, computer tapes and disks, audio and video tapes, reports, publications, symposia, workshops, briefings, etc.

ADMINISTRATION

For an initial two-year period, the Center's programs will reside in the Office of the Assistant Secretary for Water and Science, USDOJ. The Director of USGS or designee will provide supervision of the Chief.

The USGS-Flagstaff Field Center is the physical location of the Center for FY 1996-97. The decision is based on the field center's close proximity to resources being monitored and management agencies, who are users of the scientific information.

The Chief will develop a transition plan in FY 1996 for integrating GCES program plans, data and reports into those of the Center. In FY 1997, the Center Chief, working with the management team and the AMWG, will draft a proposal for the permanent administrative and physical location of the Center.

Personnel

Activities of the Center will be accomplished by an administrative/research staff of 6-10 permanent full time science and technical specialists recruited by the Center Chief. Three specialists/program managers representing physical, biological, and cultural-ethnic resource disciplines will comprise the primary program management positions in the Center, along with an information/technology

program director. The cultural resource program manager will direct Native American program coordination, and the Center Chief will direct socioeconomic monitoring and science programs.

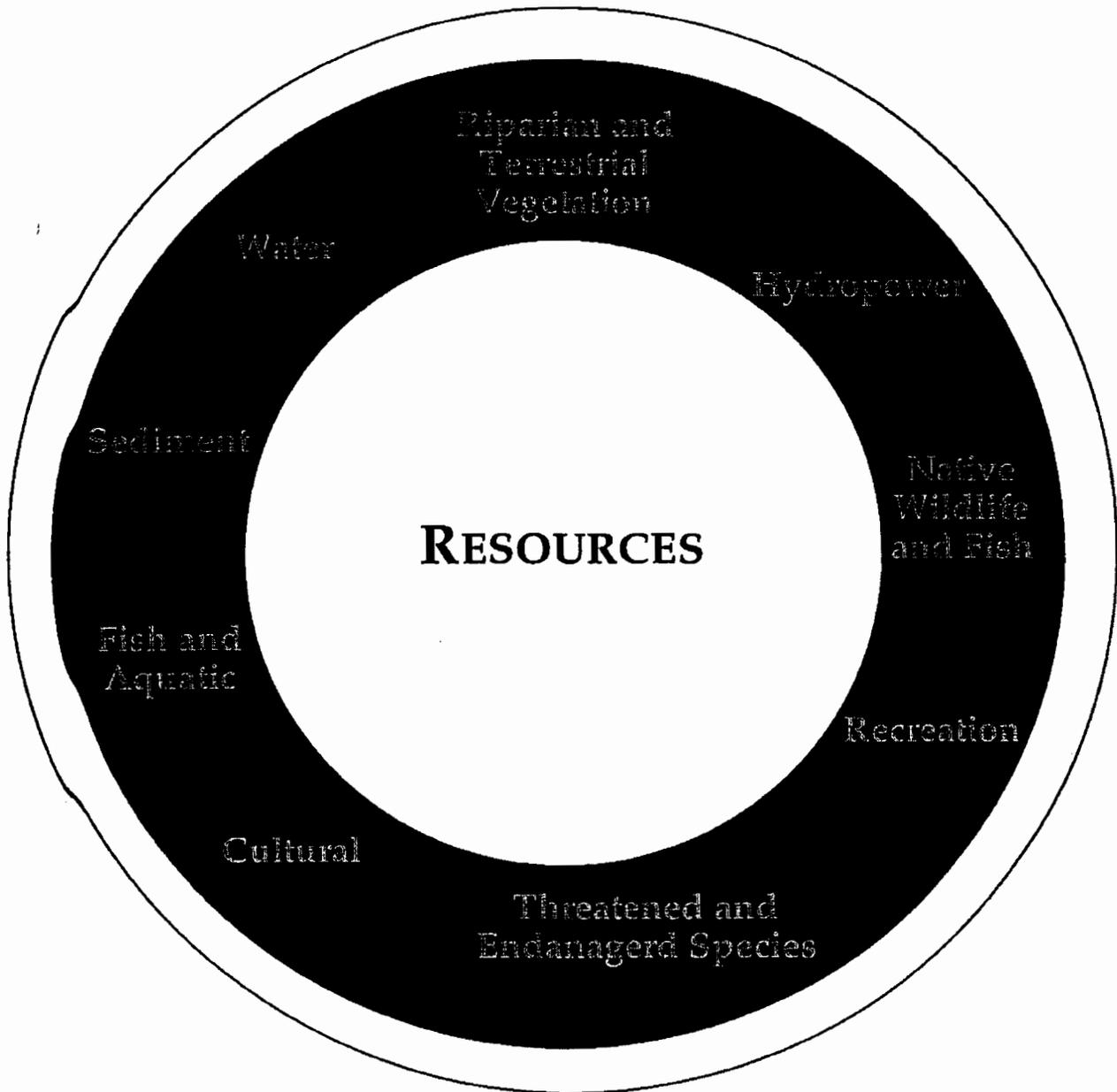
The Center Chief's primary responsibility will be to provide science and management leadership and external liaison to the office of the Secretary, other agencies, Native American tribes, non-governmental organizations and the public. Program managers will exercise primary responsibility, with the Chief, for science accomplishment and information transfer.

Additional staff and technical support may be provided from other USDO I agency programs or obtained through part-time hires or contracted personnel. Most monitoring and research program studies will be accomplished through competitive contractual research by government and non-government specialists who are not employees of the Center.

Funding

All funding for support of the Center will be provided from Colorado River Storage Project funds. These funds shall be developed from the sale of electric power from the Colorado River Storage Project (power revenues), pursuant to the Grand Canyon Protection Act, and shall be reimbursed by the Bureau of Reclamation. The annual obligation of funds for the Center is based on an annual research plan derived from the Long-Term Monitoring and Research Plan. The annual budget and science program are proposed by the Center Chief in consultation with the Adaptive Management Work Group. Final approval of the annual operating budget and research program resides with the Assistant Secretary for Water and Science.

Figure 1: Objectives resource areas identified for research and monitoring.



Adapted from *Glen Canyon Dam Management Objectives*; under cover of Bureau of Reclamation memorandum July 2, 1996 to Transition Work Group members.