

A SCHEDULE FOR COOPERATIVE DEVELOPMENT OF A LONG-TERM
MONITORING AND RESEARCH PLAN
FOR THE
GRAND CANYON MONITORING AND RESEARCH CENTER, FLAGSTAFF, AZ

Development of the Long-term Monitoring and Research Plan will be a collaborative effort led by the Grand Canyon Monitoring and Research Center. The process will have extensive involvement and input from stakeholders associated with the general Grand Canyon research area, including; federal and state agencies, Native American tribes, electric power and water management groups, environmental groups, recreation and other special interest groups.

The effort will also have extensive involvement of scientists who have conducted research in the Canyon and scientists/program managers skilled in science program development. Finally, the developed plan will receive external independent science review from the National Research Council to assure quality science programming.

The following schedule is proposed for development of the Long-term Monitoring and Research Plan (LTP).

Month	Activity
June Planning Group meeting June 19 10am-3pm Phoenix	Transition Program reviewed. Specification of stakeholder monitoring and research information needs.
July Scientist LTP Workshop July 8-11 Flagstaff Planning Group LTP Workshop July 16-17 Flagstaff	Assessment of past research and NRC reviews. Revision of draft LTP by scientists. Assessment of LTP ability to meet prescribed stakeholder monitoring and research information needs.
August Scientists LTP Workshop August 5-8 Flagstaff Planning Group meeting August 20-21 Flagstaff Proposed TWG meeting August 27 Phoenix	Revision and refinements of LTP. Refinement of LTP applicability to stakeholders' needs. Review of Draft LTP with TWG.

Month	Activity
September	
Release of draft LTP to NRC	NRC review of draft plan.
Planning Group meeting 9/17	Establish revised plan and schedule for completion of LTP.
	Evaluation of probable LTP costs of implementation.
October	
Scientists/Planning Group 2-day Workshop Colorado River location October 8-9	Clarifying mechanisms for maintaining science independence while responding to management needs.
Scientists Workshop October 10-12	Development of monitoring procedures.
November	
Scientists Workshop November 11-14	Scientists Plan for revision of LTP - refinement of ecosystem sampling procedures.
Planning Group Workshop November 19-20	
December	
Scientists Workshop December 2-10	Scientists draft final LTP
Planning Group meeting December 10	Scientists and Planning Group evaluate application of final plan to stakeholder information needs.
January - April	
	Scientists workshop for defining state of art monitoring and sampling procedures.
	Scientists workshop to develop methodologies for designing ecosystem monitoring and sampling procedures.
	Scientists develop first year annual research plan with sampling procedures.
	Planning group/scientists workshop to review applicability of annual science plan to stakeholders needs.
	Program Managers convert year/annual research plan to contract CFPs, cooperative agreements, interagency agreements, etc., for program implementation.

Month	Activity
May	<p>NRC releases final review comments on LTP to Research Center and AMWG.</p> <p>Research Center revises LTP and first year plan as necessary and reviews changes with Planning Group and AMWG.</p>
June	<p>Research Center releases to Secretary of the Interior/Assistant Secretary for Water and Science LTP, 1998 research plan for approval</p>
July	<p>Research Center implements contract CFPs, cooperative agreements, interagency agreements for first year program.</p>

TRANSITION WORK GROUP MEETING
MAY 21, 1996

PROPOSED GUIDELINES FOR OPERATION OF GRAND CANYON MONITORING
AND RESEARCH CENTER

- Initial program placement in office of Assistant Secretary for Water and Science Center Chief is supervised by the Director of USGS.
- Center Chief will develop a cooperative proposal for permanent location and structure of Center by November 1, 1997.
- Physical location; Field Facility USGS, Flagstaff, Arizona.
- Personnel will include: Chief; three programs managers; Native American Program coordinator; Information and Technology Specialist; 6-10 total permanent staff.
- Center will have three major program areas; monitoring, research, information services.
- There will be strong interaction of TWG (AMWG) and Center in specifying research agenda and priorities, program planning (LTP), and application of findings.
- Center will use several competitive procedures for program implementation (contracts, cooperative agreements, interagency agreements). However, program emphasis will be on open call for proposals and panel and peer review of all proposals.

**TRANSITION WORK GROUP MEETING
MAY 21, 1996**

**PROPOSED SCHEDULE FOR DEVELOPMENT OF THE LONG-TERM MONITORING
AND RESEARCH PLAN (LTP)**

June-September 1996	Development of draft LTP.	TWG/Center/Scientists
July 1996	Specification of 1996/97 Transition Program.	Center/GCES
September 1996	Draft of LTP to National Research Council for review.	Center/NRC
November 1996 - January 1997	Development of final draft of LTP.	Center/Scientists/TWG/NRC
January 1997	Submission of final LTP draft to NRC.	Center/Scientists/TWG
May 1997	Submission of final LTP and 1997/98 program to AMWG.	Center/Scientists/TWG
June 1997	Submission of final LTP and 1997/98 program to Assistant Secretary.	Center
July 1997	Initiative of competitive award process.	Center
October 1997	Award of 1997/98 program.	Center

TRANSITION WORK GROUP MEETING
MAY 21, 1996

PROPOSED PROTOCOLS FOR OPERATION OF GRAND CANYON MONITORING
AND RESEARCH CENTER.

- Protocols for a merged adaptive management/ecosystem science approach by the GCMRC.
- Protocols for development of the Long-Term Monitoring and Research Plan.
- Protocol for NRC review of the Long-term Monitoring and Research Program.
- Protocols for review of program science.
- Protocol for implementing contracted and related science programs.
- Protocol for permitting Center science programs in Glen, Marble and Grand Canyons.
- Protocol for Information and Technology Transfer.

PROTOCOLS FOR A MERGED ADAPTIVE MANAGEMENT/ ECOSYSTEM SCIENCE APPROACH BY THE GCMRC

- Define objectives/issues and areas of concern/interest cooperatively with stakeholders
- Develop a shared vision of the ecosystem's desired future conditions and processes
- Characterize historic and present ecosystem conditions, ranges of natural variation, effecting variables, chaotic processes, etc.
- Establish ecosystem science program goals, priorities, schedules, etc., and long-term monitoring and research plan (LTP)
- Annually Implement, monitor, and modify differing programs, using input and consultation from the AMWG
- Transfer critical science and information to stakeholders

GENERAL PROTOCOL FOR ADAPTIVE MANAGEMENT AND ECOSYSTEM SCIENCE PROGRAM IMPLEMENTATION

The following protocols will be subscribed to by the GCMRC in implementing the adaptive management/ecosystem science process:

1. The GCMRC will work cooperatively with the Adaptive Management Work Group/Technical Work Groups toward specification of short and long-term monitoring and research needs of Grand Canyon, Marble Canyon and Glen Canyon ecosystems.
2. The development of long-term (and short-term) monitoring/research programs, as well as, criteria and standards, will utilize an interactive process of input and review by the AMWG.
3. The GCMRC will utilize an ecosystem science paradigm to design and conduct monitoring and research programs, blending interactive attributes of physical, biotic, and human science issues.
4. The Information Transfer Programs developed cooperatively with AMWG will be specifically designed to enhance science and information transfer to agencies and stakeholders having critical need for knowledge of status of resources in the Canyons. Areas of sensitive information (cultural resources, endangered species) will of necessity invoke protective constraints.

PROPOSED PROTOCOLS FOR DEVELOPMENT OF THE LONG-TERM MONITORING AND RESEARCH PLAN

The LTP development will:

1. Respond to guidelines in the Grand Canyon Protection Act, appropriate federal and state legislation and Glen Canyon Dam EIS
2. Be based on objectives and information needs specified by the AMWG
3. Incorporate the ecosystem science and monitoring paradigm and appropriate existing science
4. Involve interactive collaboration of Center scientists and the Transition Work Group
5. Receive independent review of preliminary and final drafts by the National Research Council

PROTOCOL FOR NRC REVIEW OF THE LONG-TERM MONITORING AND RESEARCH PROGRAM

The selected protocol is as follows:

1. NRC's involvement in providing input (guidance) to the Long-Term Monitoring and Research Program Plan (LTP) will be directly with the Center Science Group and Technical Work Group. The NRC will provide its final independent review of the LTP directly to the AMWG.
2. Between May 1996 and January 1997, the center research staff working cooperatively with a subgroup of the Transition Work Group and a diverse group of scientists will develop two consecutive drafts of the LTP. NRC input to development of the LTP will occur as independent reviews on both the first and second drafts provided to NRC in September, 1996 and January, 1997 respectively. Approval of the LTP by the Washington management team will occur after AMWG and NRC review of the final LTP in the spring of 1997.
3. NRC's review will focus on the following:
 - a. Appropriate incorporation of the adaptive management process. That is, assessment of the effectiveness in which the AMWG and the Center use adaptive management to specify monitoring and science needs.
 - b. How specific LTP components and priorities respond to the scientific investigation necessary to satisfy research and information needs specified by the AMWG.
 - c. Effectiveness in which a new science paradigm, ecosystem science is being applied.
 - d. Effectiveness to which proposed research procedure reflect appropriate scientific method.
 - e. Expected effectiveness to which the LTP studies will resolve critical ecosystem resource issues in Glen, Marble and Grand Canyons.

PROTOCOLS FOR REVIEW OF PROGRAM SCIENCE

The Center will provide leadership in insuring that monitoring and research programs respond to managers and stakeholders information needs, and that research proposals, manuscripts, technologies, guidelines, etc., meet the rigors of scientific review. To accomplish this end, differing review methodologies will be employed, and differing scientific groups will be utilized in the reviews.

1. At least five differing review procedures will be implemented for: (1) Developing short and long term science plans; (2) monitoring and science proposals; (3) data in it's various formats, i.e.; cartographic, GIS, etc.; (4) printed research directed at some form of publication; and (5) general program accomplishment.
2. Specific protocols for the differing types of reviews need not receive detailed definition beforehand. Flexibility should be permitted to reviewing groups on procedures, except that reviews of programs, data, documents, technology, procedures, etc., should assure that:
 - a. Science programs and priorities reflect specific needs of managers and stakeholders.
 - b. Appropriate high quality scientific methodology is being utilized, and research findings and interpretations are of the highest quality and accuracy.
 - c. Application of the ecosystem science process is dominant.
 - d. Program and study designs optimize opportunity for application.
 - e. Programs, studies, and information transfer reflects both cost efficiency and effectiveness.

PROPOSED PROTOCOL FOR IMPLEMENTING CONTRACTED SCIENCE PROGRAMS

The contracted science program will be:

1. Be specified in both the Long-Term Plan (LTP) and annual science plan.
2. Be approved by the AMWG and Center Chief.
3. Include monitoring, research and information transfer technology.
4. Be conducted using ecosystem science and monitoring designs.
5. Be reviewed by a panel of specialists which are selected using criteria pre-approved by the AMWG.
6. Be awarded through a competitive process using appropriate advertising procedures and outlets.
7. Be awarded for a maximum of three years based on available funding.

PROPOSED PROTOCOL FOR PERMITTING CENTER SCIENCE PROGRAMS IN GLEN, MARBLE AND GRAND CANYONS

1. All programs, projects and studies proposed for permitting will have received specified AMWG and external reviews
2. Studies will incorporate all federal and state agency and Native American Tribe permitting requirements into the proposed development process, including time requirements.
3. Center Program managers will provide necessary training for contractors and oversight of contractors to assure compliance to agency and tribal permits.

PROTOCOL FOR INFORMATION AND TECHNOLOGY TRANSFER

Significant emphasis must be placed on the application of research and technology developed in this program. As such, an information transfer program will have the following protocols.

1. Development of science information and understanding should relate to the interaction and integration of resources within the ecosystems where they exist. A hierarchy of ecosystems exist within the Colorado River corridor.
2. The Adaptive Management Group will work cooperatively with the GCMRC in specifying effective methods for information transfer, including; scientific papers, technical papers, management guidelines, white papers on resource assessments and management policy, status of knowledge assessments and guidelines, workshops, data bases, management and analytic technologies, GIS, cartography, and video, etc.
3. The GCMRC will create integrated computerized data base management systems which permit direct access to data and information by managers and stakeholders.
4. The GCMRC will provide training to analysts, managers, and stakeholders to improve the utilization of information and technology developed by the center.
5. The GCMRC will provide managed access to analysts and researchers by managers needing immediate assistance with policy issues and/or resource management issues.
6. The GCMRC center chief working with the AMWG will design protocols for restricted access to selected data and or information, such as priority data and location of cultural resources and endangered species.

JUSTIFICATION FOR ADAPTIVE MANAGEMENT PROGRAM

The Adaptive Management Program is justified because of the need for ongoing operational flexibility of the Glen Canyon Dam to respond to monitoring and research findings and varying resource and societal conditions.

PURPOSE OF ADAPTIVE MANAGEMENT PROGRAM FOR OPERATION OF GLEN CANYON DAM

To monitor Glen Canyon Dam operations and exercise other authorities under existing law as provided in the Grand Canyon Protection Act, and the Glen Canyon Dam EIS. Provide recommendations for dam operations to the Secretary to protect, mitigate adverse impacts to, and improve the values for which the Glen Canyon National Recreation Area and Grand Canyon National Park were established.

ECOSYSTEMS AND ECOSYSTEM MANAGEMENT

Ecosystems

An ecosystem is an interconnected community of living things, including humans, and the physical environment within which they interact.

The Ecosystem Management Approach

The ecosystem management approach is a method (process) for sustaining or restoring natural physical, biological, and social systems and their functions and values.

Goal of Ecosystem Approach

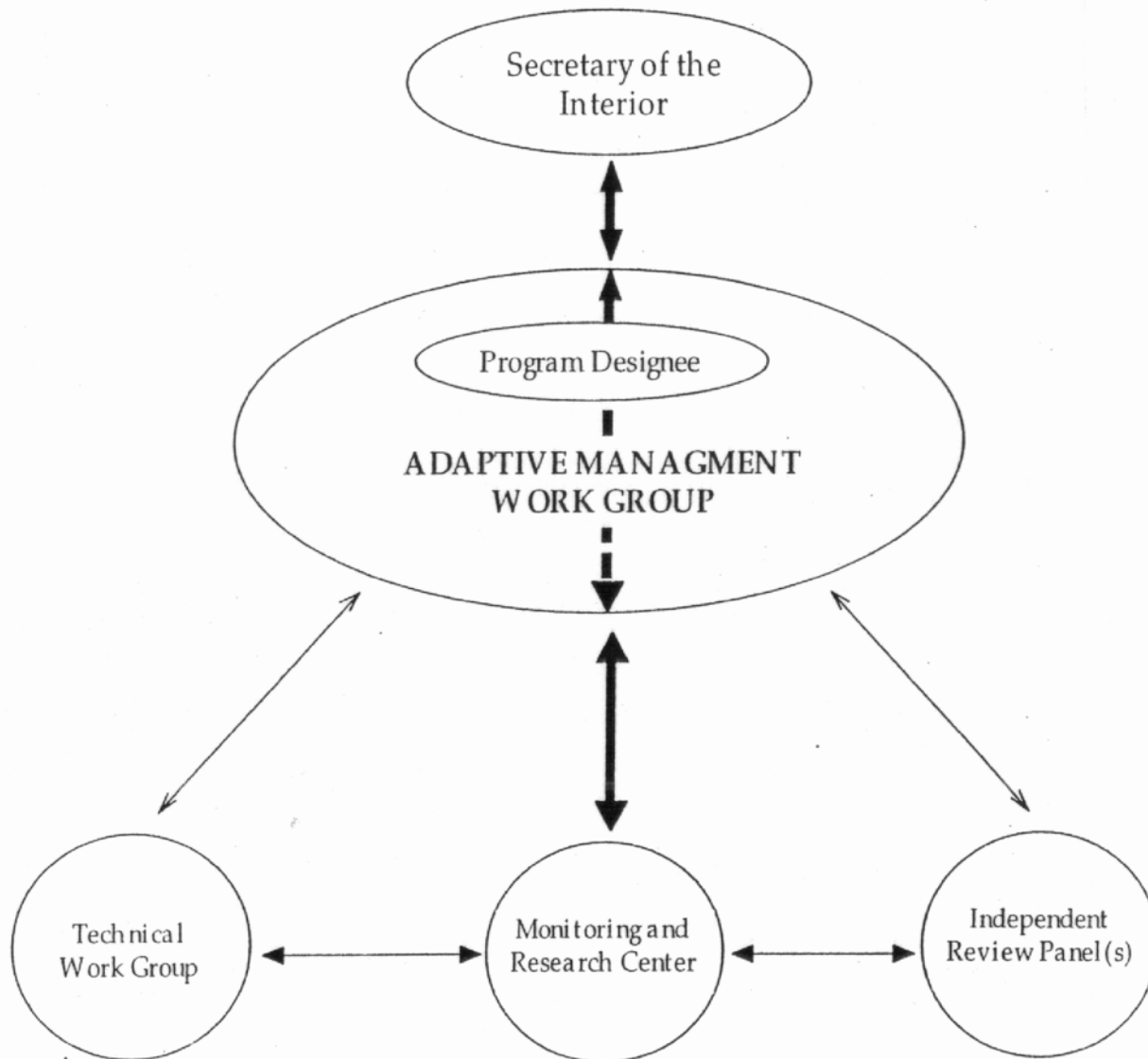
The goal of the ecosystem approach is to restore and sustain the health, productivity, and diversity of ecosystems and the overall quality of life through natural resource management approaches that are fully integrated with social and economic goals.

JUSTIFICATION FOR THE GRAND CANYON MONITORING AND RESEARCH CENTER

Long term monitoring and research are essential to adaptive management and will provide critical information and science regarding the downstream impacts of and/or future adjustments to dam operations on Grand Canyon and Glen Canyon resources.

ECOSYSTEMS AND ECOSYSTEM MANAGEMENT

The Adaptive Management Program and processes for determining future operations of Glen Canyon Dam



RESPONSIBILITIES AND AUTHORITIES UNDER GRAND CANYON PROTECTION ACT AND RELATED EIS

Secretary of Interior

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graph TD; A[Secretary of Interior] <--> B[Authorities]; A <--> C[Responsibilities]; B <--> C;
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The diagram illustrates the relationship between the Secretary of Interior, Authorities, and Responsibilities. The Secretary of Interior is at the top, with a double-headed arrow connecting to the Authorities. The Authorities are listed below the Secretary of Interior, with a double-headed arrow connecting to the Responsibilities. The Responsibilities are listed below the Authorities, with a double-headed arrow connecting back to the Secretary of Interior.

- Authorities
 - All activities for protection, management and use of all public resources
 - Establishment and administration of Adaptive Management Program
- Responsibilities
 - To insure appropriate protection, management and use of all public resources affected by operation of the Glen Canyon Dam

RESPONSIBILITIES AND AUTHORITIES UNDER GRAND CANYON PROTECTION ACT AND RELATED EIS

Adaptive Management Work Group

- Authorities
 - Provide framework for adaptive management, policy goals and direction
 - Define research information needs, criteria and standards to understand impact of dam operations
 - Facilitate coordination and input from interested parties
 - Develop recommendations for modifying operating criteria and for other resource management actions
- Responsibilities
 - Inform the Secretary (designee) regarding impacts of selected and future dam operations on all Grand Canyon and Glen Canyon resources
 - Recommend appropriate Dam operations

RESPONSIBILITIES AND AUTHORITIES UNDER GRAND CANYON PROTECTION ACT AND RELATED EIS

Technical Work Group

- Authorities
 - Translate AMWG goals and policy into resource management objectives and establish criteria and standards for long-term monitoring and research
- Responsibilities
 - Work cooperatively with AMWG and GCMRC to insure appropriate criteria and standards for long-term monitoring and research

RESPONSIBILITIES AND AUTHORITIES UNDER GRAND CANYON PROTECTION ACT AND RELATED EIS

Grand Canyon Monitoring and Research Center

- Authorities
 - Interact with AMWG, ISRG, TWG, designee and other adaptive management program entities to design and accomplish ecosystem monitoring and research programs
 - Conduct monitoring and research program responding to specific research and information needs of Adaptive Management Work Group
- Responsibilities
 - Cooperating with the AMWG to develop, implement and administer ecosystem monitoring and research programs (including information transfer) responding to resource issues, concerns and opportunities of Grand Canyon and Glen Canyon ecosystems

RESPONSIBILITIES AND AUTHORITIES UNDER GRAND CANYON PROTECTION ACT AND RELATED EIS

Independent Science Review Group

- **Authorities**
 - Evaluate scientific process and procedures
 - Review science products and programs
- **Responsibilities**
 - Provide technical advice to GCMRC and AMWG on
science process, procedure, programs and products