GLEN CANYON DAM MANAGEMENT OBJECTIVES
July 2, 1996

PURPOSE

The purpose of the management objectives is to define measurable standards of desired conditions which will serve as targets expected to be achieved by the participants in the Glen Canyon Dam EIS process. These expectations are framed within the Preferred Alternative and implemented by specific dam operating criteria. It is the purpose of this effort to monitor impacts of and or change where necessary these specific operating criteria to achieve the overall goals of the EIS process.

BACKGROUND

The Operation of Glen Canyon Dam Final Environmental Impact Statement states that an Adaptive Management Program (AMP) will be initiated following the issuance of a Record of Decision by the Secretary of the Interior. The concept of adaptive management is based on the recognized need for operational flexibility to respond to future monitoring and research findings and varying resource conditions. The purpose of the AMP will be to develop modifications to the Glen Canyon Dam Operations and to exercise other authorities under existing laws 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. The AMP will monitor the results of the operating criteria adopted by the Secretary as a result of the EIS process and develop proposed changes to those criteria and propose other actions as necessary to achieve the results anticipated in the EIS.

Principals which guided the design of the AMP include:

- Monitoring and research programs should be designed by qualified researchers in direct response to the needs of management agencies.

- A process is required to coordinate and communicate management agency needs to researchers and to develop recommendations for decision making.

The Transition Work Group recognized the desirability of beginning the process of clarifying and consolidating the management objectives of agencies that will be participating in the AMP in order to clearly identify management needs to the researchers. Initiating this process will facilitate and expedite monitoring and research design when the AMP is formally initiated. A Management Objectives Subgroup was formed to develop draft objectives, herein defined as Resource Management Targets, for this purpose.

WATER

Operate Glen Canyon Dam in a manner fully consistent with the preferred alternative and subject to the Grand Canyon Protection Act of 1992, the Colorado River Compact, the Upper Colorado River Basin Compact, the Water Treaty of 1944 with Mexico, and the provisions of the Colorado River Storage Project Act of 1956, and the Colorado River Basin Project Act of 1968 that govern allocation, appropriation, development, and exportation of the waters of the Colorado River Basin.

SEDIMENT

The overall resource management target is to maintain a range of sediment deposits over the long-term, including an annually flooded bare-sediment (unvegetated) active zone, a less frequently flooded vegetated zone, terraces (within the 45,000 cfs river stage), and backwater channels. The goal of managing sediment resources will be on a reach-scale basis. Should significant and localized adverse impacts occur, site-specific mitigation would be considered along with possible modifications to dam operations.

Specific targets are as follows:

o As a minimum, maintain the number and average size (area and thickness) of sandbars between the stages associated with flows of 8,000 and 45,000 cfs and the number and average size of backwaters at 8,000 cfs that existed during the 1990-91 research flows.

Periodically increase the average size of sandbars above the 20,000 cfs river stage and number and average size of backwaters at 8,000 cfs up to the amounts measured after the 1996 test of the beach/habitat-building flow in as many years as reservoir and downstream conditions allow.

o Maintain system dynamics and disturbance (in years which Lake Powell water storage is low) by redistributing sand stored in the river channel and eddies to areas inundated by river flows between 20,000 and 30,000 cfs.

o Maintain system dynamics and disturbance by redistributing sand stored in the river channel and eddies to areas inundated by river flows up to 45,000 cfs in as many years as possible when downstream resources warrant and when Lake Powell water storage is high. The degree to which these targets are met can be monitored by measuring the area of bare sediment deposits, and the number and size (thickness and area) of representative sandbars.

o Maintain a long-term balance of river-stored sand to

support the annual habitat maintenance flow (in years of low reservoir storage), beach/habitat-building flow (in years of high reservoir storage), and unscheduled flood flows.

FISH AND AQUATIC

Goals: **1.** To conserve and enhance the native fish communities while providing for cold water sportfish populations and recreational opportunities.

2. Maintain native fish populations at or above levels observed on average over the last ten years, measured on a rolling-ten-year average.

The following are specific targets:

Native Fishes:[1] [2]

- Maintain or enhance the existing population of humpback chub at or above 1987 levels determined by April/May hoop-net monitoring in the lower 1200 meters of the LCR. (Focused on fish >200mm, and should include a fish health assessment.)

- Maintain levels of recruitment of humpback chub in the mainstem and LCR, as indexed by size frequency distributions and presence and strength of year-classes. (Focused on young-of-year and juvenile fish, and should include a fish health assessment.)

- Establish a second, self sustaining population of humpback chub by 2005, contingent on feasibility. Monitor for and determine the contribution of other existing spawning aggregations as one component of assessing feasibility.

- Verify the status of and manage for healthy, self sustaining populations of flannelmouth sucker, bluehead sucker, and speckled dace in the mainstem Colorado River in Grand Canyon and its tributaries.

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[1] Note that Endangered Fishes are treated in this section, and we have avoided duplicating that information in the Endangered Species section.

[2] Note that Critical Habitat has been designated in Grand Canyon for both razorback sucker and humpback chub. As Critical Habitat for razorback sucker, Grand Canyon may have a role in recovery as a reintroduction site. Such actions would need to be guided by the recovery plan (now in prep) or regional implementation plans.

(Focused on young-of-year, juvenile, and adults to determine size frequency distributions, densities [via catch rates], and assessment of fish health.)

- Verify the status of and manage for healthy, self sustaining populations of native fish in Glen Canyon based upon the capability of the habitat to support those fishes. (Focused on young-of-year, juvenile, and adults to determine size frequency distributions, densities [via catch rates], and assessment of fish health.)
- Maintain the processes that create and sustain backwaters in the zone between 8,000 and 20,000 cfs. As a minimum, the numbers, area, and quality[3] of backwaters should exceed levels detected by geomorphic reach during 1990-91. Upper level targets for numbers, area, and quality should approximate that achieved by 1996 Beach/Habitat Building Flow Experiment (outcomes speculative at this time - alternatively post-1993 flood levels could be used) in as many years as downstream conditions warrant.

Trout:

o In the Colorado River Corridor below Glen Canyon Dam to the confluence with the Paria River, naturally reproduced fish should compose at lease 50% of the Age III rainbow trout. Sufficient suitable spawning habitat should be maintained to reach this objective. The total population of rainbow trout (age II plus) in this reach should be maintained at approximately 100,000 fish as determined from population estimation. Rainbow trout should achieve 18 inches in length by Age III with a mean relative weight (Wr) of at least 0.80.

Nonnative Warm Water and Cool Water Fishes:

o Minimize, to the extent possible, interactions between native and non-native fishes.

Aquatic Food Base:

o Maintain and enhance the Aquatic Food Base in Glen

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[3] Note that a Backwater Quality Index needs to be developed based upon existing data. Critical elements include descriptors of geometry (depth, width), velocity, temperature (maximum and duration), and food production. Numbers and areas of backwaters are detectable from aerial photography/videography; quality factors may require site specific sampling.

Canyon. Maintain continuously inundated areas for Cladophora and aquatic invertebrates at or above 5,000 cfs discharge.

VEGETATION & TERRESTRIAL WILDLIFE

I. Vegetation - Maintain dynamic vegetative communities made up of diverse groups of native riparian and upland species (where affected by dam operations) at different stages of succession and at different elevations above the water line.

- Preserve or restore (where possible) natural species composition and abundance within riparian and upland communities affected by dam operations.

- Emphasize the preservation of unique plant communities and any special status species (Federal, tribal, and state designations) to ensure their perpetuation within the system.

II. Wildlife - Maintain a diversity of wildlife species associated with ongoing natural evolutionary and ecological processes giving priority to native species (i.e., those occurring not directly because of man).

- Manage and maintain aquatic and riparian habitat to preserve a diverse mosaic of physical and biological characteristics to ensure that viable populations of resident and migratory wildlife continue to exist and flourish.

- Protect, restore, and enhance survival of special status species (Federal, tribal, and state designations). Ensure that the required habitat for these species is preserved.

THREATENED AND ENDANGERED SPECIES

o Maintain native faunal components of the ecosystems for the benefit of threatened and endangered species. Maintain a natural age-class distribution through out the majority of natural range in Glen and Grand Canyons, emphasizing the need to recruit into breeding age classes. Manage the viability of the food chain for native fauna, including the Peregrine Falcon, Willow Flycatcher, and other special status species.

o In as much as such management is not deleterious to naturally occurring ecosystem components, consider and mitigate impacts to special status species that may use the River corridor opportunistically (Bald Eagle). Maintain self-sustaining fish populations as forage to

provide opportunities for bald eagles. Monitor for nesting.

o The population of Kanab Ambersnail should be inventoried and maintained near current levels. Efforts to establish additional population centers should be guided by the recovery plan for the species.

Note: Resource management targets for threatened and endangered fish species are located in the section entitled Fish and Aquatic.

CULTURAL RESOURCES

Definition: Cultural resources include prehistoric and historic archaeological sites, structures and properties of interest to all Americans. Of particular importance are traditional cultural properties, sacred sites, collection areas, and other resources that are important to Native Americans in maintaining their cultural heritage, lifeways, and practices. Cultural resources ~~are nonrenewable and irretrievable if lost.~~

o Primary Target: Conserve "in situ" all the downstream cultural resources to take into account Native American cultural resource concerns in Glen and Grand Canyons.

Secondary Target: If "in situ" conservation is not possible, design and implement mitigative strategies that integrate the full consideration of the values of all concerned tribes, with in applicable laws, using a scientific approach.

o Primary Target: Maintain and integrate all cultural data recovered from monitoring, remedial, and mitigative action for those sites affected by dam operations and incorporate these data into the evolving research designs for understanding the human occupation and use of the Grand and Glen Canyons.

RECREATION

Provide quality recreational opportunities that do not adversely impact natural or cultural resources within the river corridor.

o Maintain or improve the wilderness character of the recreational experience.

o Maintain flows and sediment processes that create an adequate quantity, distribution and variety of beaches for camping, as long as such flows are

consistent with management of other natural resource values.

o Maintain flows that do not preclude navigability by whitewater craft in Grand Canyon and power craft in Glen Canyon and upper Lake Mead.

o Maintain quality cold water fishery opportunities in Glen Canyon.

o Maintain sport hunting opportunities for waterfowl in Glen Canyon.

HYDROPOWER

Maximize the value of long term firm power and energy generation within the criteria and operating plans established by the Secretary under Section 1804 of the Grand Canyon Protection Act.

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