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FLAGSTAFF, AZ**Current Grand Canyon Resource Issues:  
Briefing Paper Series****Colorado River Management**

*The heart and soul of the Grand Canyon is the Colorado River. For millions of years this river carved the majestic canyons, spring flood waters carrying millions of tons of sediment down to the Sea of Cortez. Its unique physical and biological ecosystem developed in delicate balance. That balance was interrupted by the completion of 640 ft. tall Glen Canyon Dam in 1963. The dam moderated the river's floods, trapped its sediment and created a cold, clear river within Grand Canyon. In the following 30 years, beaches disappeared, 3 of 8 native fishes were extirpated, and a broad green band of vegetation appeared along the shoreline. In the late 1970s, concern from river runners and environmental groups focused attention on these impacts. The 1992 passage of the Grand Canyon Protection Act mandated that Glen Canyon Dam be operated to benefit the river's natural and cultural resources. These actions and a series of scientific studies have led to dam operations that lessen impacts to the river's resources. This past March, in a cooperative effort by water, power, tribal, environmental and recreation interests, an experimental flood release from Glen Canyon Dam was used to restore the natural dynamics of the river ecosystem downstream. The initial results (beach deposition, fish habitat creation, cultural resource protection) of this experiment were positive. This fall the secretary of interior will issue a Record of Decision which will determine future operations of Glen Canyon Dam. Despite many successes, the responsibility for managing the Colorado River in Grand Canyon for the foreseeable future lies with man rather than nature and continued work and vigilance will be necessary to protect its resources.*

**BACKGROUND**

Strangely, little thought was given to the Colorado River in Grand Canyon when Glen Canyon Dam was constructed. Nor even during the fierce political fight that ensued with the proposal to build two more "cash register" dams within the Canyon. But today we understand the profound effects that 30 years of clear, cold water releases have had on the riparian ecosystem downstream. The changes are obvious. The lack of large spring floods has allowed a broad band of vegetation to establish itself along the river banks. The muddy torrents that used scour the canyon each spring are replaced by cold, clear, predictable releases from Glen Canyon Dam. Large sand beaches that once graced the river channel are greatly reduced. Three of the river's eight native fishes have been completely eliminated from the system; four others are endangered or threatened and exotic fish and vegetation now dominate the ecosystem. Simply put, the dynamics nature provided the ecosystem has been removed by the damming of the river.

A public outcry in the late 1970s over these impacts led the Bureau of Reclamation to initiate scientific studies on dam operations. These studies, Glen Canyon Environmental Studies phase 1 (GCES1), determined that dam operations had adverse impacts on the ecosystem downstream. In 1989,

a grassroots political campaign forced Interior Secretary Lujan to order a comprehensive Environmental Impact Study (EIS) on the operations of Glen Canyon Dam. The Department of Interior imposed "interim flows" in 1991 to slow ongoing damage. But these were largely stopgap measures by federal officials designed to stop more restrictive changes to dam operations. Finally in 1992, grassroots public pressure on Congress resulted in the passage of the Grand Canyon Protection Act. This Act mandated that the dam be operated "...in such a manner as 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."

**GLEN CANYON DAM EIS**

In March 1996 the final draft of the Glen Canyon Dam Environmental Impact Statement (EIS) was issued by the Bureau of Reclamation. The EIS preferred alternative recommends to the secretary of the interior operating criteria described in the box (see reverse). Despite some lingering concerns by several interest groups, there is general support for the recommendations. Following the completion this fall of an audit of the EIS by the General Accounting Office, the

secretary is expected to issue a Record of Decision that follows these recommendations. In addition to the operational components there are important "common elements" that are recommended.

### BEACH/HABITAT BUILDING FLOWS

The first test of this important management tool was accomplished this past April. Designed to restore dynamics to the river system, a dam release of 45,000cfs (only one-half the average annual predam flood) for a period of 7 days picked up sand stored in the river channel and successfully deposited it as beaches, reshaped backwaters, and protected cultural sites. While the long-term biological and physical benefits remain to be seen, the initial results were a success. Perhaps the greatest single success of the flow was the fact that it was completed without litigation, a consensus of widely diverse interests.

### HABITAT MAINTENANCE FLOWS

These annual or semi-annual flows up to 30,000 cfs are intended to provide system dynamics, rejuvenating backwaters and other aquatic habitats.

### ADAPTIVE MANAGEMENT PROGRAM

Perhaps the most important agreement among scientists and managers during the EIS was that we do not yet, and may never, completely understand the river's complex ecosystem. Management must constantly respond to new knowledge; the solution is a process called Adaptive Management. An Adaptive Management Work Group, composed of representatives from all interest groups, will oversee continuing research and make recommendations for management changes based on current knowledge. This cooperative approach to management is an experiment in itself, needing the constant work and vigilance by all interests.

### EIS PREFERRED ALTERNATIVE

Minimum release: 8,000 cfs day (5,000 cfs at night)

Maximum release: 25,000 cfs

Allowable daily fluctuation:

5,000 cfs (low volume months)

6,000 cfs (medium volume months)

8,000 cfs (high volume months)

Ramp rates: 4,000 cfs/hr up

1,500 cfs/hr down

Common elements:

Flood Frequency reduction measures

Beach/Habitat Building Flows

Beach Habitat Maintenance Flows

Native fish backwater studies

Selective Withdrawal structure studies

Adaptive Management Program

### SELECTIVE WITHDRAWAL STRUCTURE STUDIES

This proposed structure, attached to the dam at the cost of \$60 -100 million, would allow managers to release water from a variety of lake levels, warming or cooling the river water below. Warming the river could benefit the native fishes. A fear, though, is that the warmer water could benefit predatous exotic species as well, ultimately damaging the natives. Studies are underway to establish the benefits and risks of these structures.

### NATIVE FISH BACKWATER STUDIES

Seasonally adjusted steady flows were thought by many to be the most beneficial method of releasing water. One argument was that steady flows during the summer would allow quiet backwaters to warm and benefit native fishes. Studies are presently underway to determine the benefits and risks of such a strategy. If risks are not too great, experimental summer steady flows will be implemented by 1998.

### UPDATE:

*On October 6, 1996, in the sunny patio of the Botanical Gardens in Phoenix, Arizona, Secretary Babbitt signed the Record of Decision (ROD) on the future operations of Glen Canyon Dam. That event marked a turning point in the management of that dam and, indeed, in how our society views the importance of our river systems. Key elements of the ROD include limits on daily operations and periodic flood releases. From this day forward, the health and well-being of the downstream natural and cultural resources of the Colorado River will drive the operations of Glen Canyon Dam.*

*The Trust and other conservation groups continue to work with the Bureau of Reclamation and other interests to implement a workable adaptive management process. The Grand Canyon Monitoring and Research Center is being formed and a long-term monitoring program initiated. Studies on the benefits of warming the river's waters to benefit native fishes continues. These actions represent changes in the operation and management of Glen Canyon Dam that we could not even imagine two decades ago. Many thanks to the many individuals who lent their support. Please stay tuned.*

*For more information contact Grand Canyon Trust at the address below or on the World Wide Web at the Unofficial Grand Canyon National Park Homepage at:*

*<http://www.kaibab.org>*