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GLEN CANYON DAM INTERIM OPERATING CRITERIA

FINDING OF NO SIGNIFICANT IMPACT

AND

ENVIRONMENTAL ASSESSMENT

OCTOBER 1991

GLEN CANYON ENVIRONMENTAL
STUDIES OFFICE

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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

UPPER COLORADO REGION
SALT LAKE CITY, UTAH

FINDING OF NO SIGNIFICANT IMPACT

GLEN CANYON DAM INTERIM OPERATING CRITERIA
ARIZONA

Recommended: *Larry Walhousek* 10/31/91
Regional Environmental Officer Date

Approved: *Robert Adams* 10/31/91
Regional Director Date



FINDING OF NO SIGNIFICANT IMPACT

Glen Canyon Dam Interim Operating Criteria Arizona

In accordance with the National Environmental Policy Act of 1969, as amended, and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508), the Bureau of Reclamation (Reclamation) has determined that an environmental impact statement (EIS) is not required for implementation of the Glen Canyon Dam interim operating criteria, Arizona.

BACKGROUND

The Secretary of the Interior, on July 27, 1989, directed the preparation of an EIS on the effects of the operation of Glen Canyon Dam on the environmental and ecological resources on the Colorado River downstream of Glen Canyon Dam in Glen Canyon National Recreation Area and Grand Canyon National Park. The EIS and associated Glen Canyon Environmental Studies are currently being undertaken to evaluate the impacts of current and alternative dam operations on the downstream resources. The environmental studies included research flows from June 1990 through July 1991 to help determine the impact of alternative dam operations. Following completion of the EIS and subsequent Record of Decision (ROD) in about 3 years, final operating criteria for Glen Canyon Dam will be implemented.

To provide interim protection of downstream resources until completion of the ROD, the Secretary of the Interior committed to implement interim operating criteria within 90 days of completion of the research flows. The interim operating criteria are to be implemented by November 1, 1991, and continue until a decision is made on the final operating criteria.

The interim operating criteria are a temporary measure designed to ameliorate the rate of adverse change on downstream resources resulting from past dam operations, and to continue to gather information on those changes pending completion of the current EIS on dam operations and a final decision on permanent long-term operating criteria.

PROPOSED ACTION

The Glen Canyon Dam interim operating criteria, low fluctuating flow alternative, would protect downstream Colorado River resources pending completion of the Glen Canyon Dam EIS and the ROD selecting and implementing a final plan for operating Glen Canyon Dam. It would permit release of water from Glen Canyon Dam in a manner that would decrease the magnitude of daily fluctuating flows and ramping rates in order to reduce the adverse effects of current powerplant operations on downstream beaches, sediment-dependent resources, and aquatic resources. Fluctuating flows for power generation would be well below existing levels.

Daily fluctuations would be limited to 5,000, 6,000, or 8,000 cubic feet per second (cfs), depending on monthly release volumes. The maximum flow under a fluctuating flow regime would be limited to 20,000 cfs; any release greater than 20,000 cfs, in order to avoid anticipated spills or in years when the annual release exceeds 8.23 million acre-feet (maf), would be evaluated with the Cooperating Agencies and the seven Basin States.

Minimum flows would be 5,000 cfs between 7 p.m. and 7 a.m. and 8,000 cfs between 7 a.m. and 7 p.m. The 8,000 cfs minimum flow requirement from 7 a.m. to 7 p.m. will be shifted to 8 a.m. and 8 p.m. respectively beginning the last Sunday in October and ending the first Sunday in April, Arizona local standard time. Ramping rates would be limited to 2,500 cfs per hour for increasing flows and 1,500 cfs per hour for decreasing flows.

The scheduled annual and monthly release volumes would be determined using existing practices based on considerations for maintaining conservation storage, avoiding spills, balancing storage between Lakes Powell and Mead, and when possible, meeting power needs, recreational demands, and fish and wildlife concerns.

Operational and financial exception criteria are elements of the low fluctuating flow alternative. Exception criteria provide for the criteria described above to respond to system disturbances or other emergency conditions, for system regulation, and as a means of avoiding the expense of purchasing replacement firm capacity and energy. The use of the latter exception (termed financial exception criteria) would be limited to 3 percent (22 hours) of any consecutive 30-day period. The hydropower resource would display minimal increases in system-wide power production costs, but with financial exception criteria in place, increased power purchase costs to consumers should be minor. The exception criteria are detailed in an October 21, 1991, Interagency Agreement between Reclamation and Western Area Power Administration.

A detailed discussion of the proposed interim operating criteria and environmental consequences is found in the October 1991 final Environmental Assessment on the Glen Canyon Dam Interim Operating Criteria.

ENVIRONMENTAL IMPACT

The proposed action would not constitute a major Federal action having significant effects on the quality of the human environment. The environmental assessment and subsequent comments indicate that impacts to the human environment would be short term and minor. Summarized below are the impacts of low fluctuating flows including the financial exception criteria element:

1. The proposed action would not affect climate, geology/topography, aesthetics, water supply, water quality, or air quality.
2. Sediment resources would be impacted less than under current operations. Even the most adverse condition—decreasing flow coupled with a flow decrease of more than 8,000 cfs over 24 hours—would occur infrequently and would be rapidly attenuated downstream.

3. Vegetation in the New High Water and fluctuating zones would benefit from the proposed operation, and vegetation in the Old High Water Zone would continue to decline at the present rate.
4. Because wildlife is closely tied to the riverine vegetation habitat, the effects on wildlife are equal to and are mediated by the minor effects on vegetation.
5. Native fishes and rainbow trout would be minimally benefitted from the proposed flow regime.
6. Endangered species would not be adversely affected because proposed interim operations have been designed to assist in reducing adverse impacts to downstream natural resources and to endangered, threatened, or proposed endangered species.
7. Cultural resources would be impacted less than under current operations. Reclamation and the National Park Service are consulting with the Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation for compliance with Section 106 of the National Historic Preservation Act.
8. Recreational resources would be improved by lower fluctuations and better access to the Glen Canyon reach of the river for angling and day-use rafting, and through improved camping/trip scheduling opportunities for white-water boaters.
9. Implementation of interim operating criteria would protect Indian trust assets in Glen and Grand Canyons from loss or damage until a long-term change in Glen Canyon Dam operations is implemented. The impacts to Indian trust assets would be identical to those presented above.

An environmental monitoring program, including periodic reports, would be carried out while the interim operating criteria are in effect. The program would evaluate flow characteristics, impacts of the exception criteria on flows and resources, and resources responses to the flows. The Interagency Agreement provides a mechanism for revising the flows to protect resources.



**GLEN CANYON DAM INTERIM FLOWS
ENVIRONMENTAL ASSESSMENT**

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CHAPTER I

PURPOSE AND NEED

INTRODUCTION

The purpose of this environmental assessment (EA) is to identify and evaluate the environmental impacts that would occur with the establishment of interim operating criteria for Glen Canyon Dam for about 3 years beginning November 1, 1991. This assessment is prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality Regulations 1501.4(b) and 1508.9, and current U.S. Department of the Interior and Bureau of Reclamation (Reclamation) guidelines. The Secretary of the U.S. Department of the Interior and the Commissioner of the Bureau of Reclamation are responsible for the operation of Glen Canyon Dam. This responsibility includes considering effects from the operation of the dam upon downstream resources. Interim operating criteria would lessen existing impacts of dam releases upon the downstream resources. This action is needed for protection of said resources pending completion of the Glen Canyon Dam Environmental Impact Statement (GCDEIS) and the selection and implementation of final operating criteria for Glen Canyon Dam.

BACKGROUND

On July 27, 1989, the Secretary of the Interior directed the preparation of an environmental impact statement (EIS) on the effects of the operation of Glen Canyon Dam on the downstream environmental and ecological resources of the Glen Canyon National Recreation Area and Grand Canyon National Park. The GCDEIS and associated Glen Canyon Environmental Studies (GCES) are currently being prepared to evaluate the impacts of current and alternative dam operations on the downstream resources. As part of the GCES, research flows were carried out from June 1990 through July 1991 to help determine the impact of Glen Canyon Dam operations. The preparation of the GCDEIS and subsequent Record of Decision will lead to implementation of final operating criteria for Glen Canyon Dam.

Although the commitment to prepare the GCDEIS initiated a process to resolve environmental issues, the issue of interim protection of downstream resources remained outstanding. Accordingly, the Secretary of the Interior has committed to implement interim operating criteria within 90 days of completion of the GCES research flows. These interim criteria are to be implemented by November 1, 1991, and remain in effect until a final decision on future operating criteria is made.

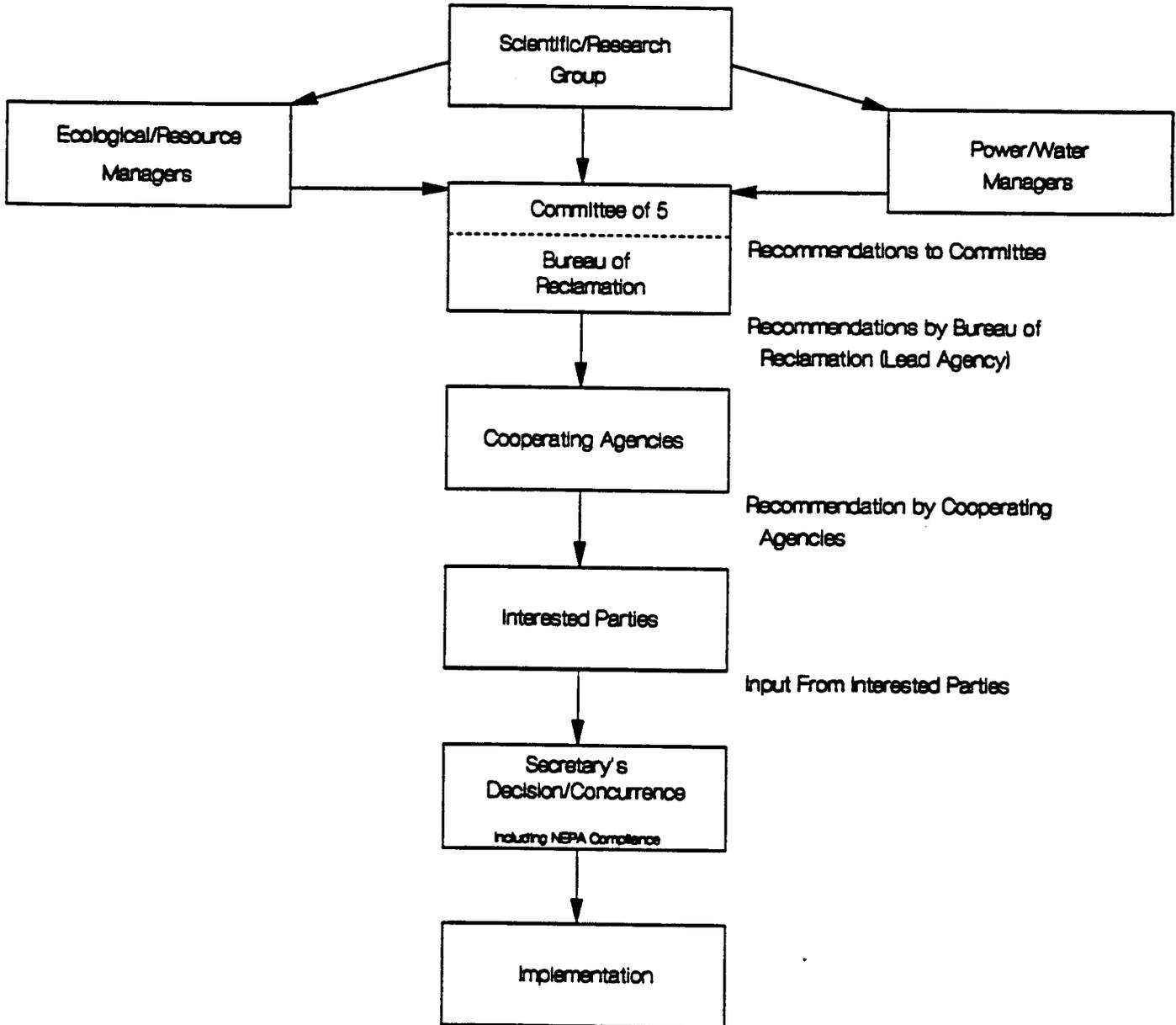
The primary issues to be evaluated in this document are: sediment, biological, cultural, recreation, and hydropower resources.

DEVELOPMENT OF ALTERNATIVES

The administrative process to develop interim operating criteria was initiated in February 1991. Figure 1 shows the basic process. It included input from the research/scientific group (R/S Group), the ecological/resource managers (E/RM Group), and

Figure 1.

Procedure to Establish Interim Operations - Glen Canyon Dam



power/water managers (P/WM Group). As lead agency, Reclamation coordinated the activities of all groups, working closely with all Cooperating Agencies and using the public involvement process which had been established as a part of the GCDEIS structure.

Building on the recommendations of a small group of scientists familiar with the impacts of current dam operations, the R/S Group developed an alternative that was their best estimate for a flow regime to protect the downstream resources in the short term. The E/RM Group—which was composed of State and Federal officials charged with managing the downstream environmental resources—developed an alternative that was very similar to that of the R/S Group.

The Western Area Power Administration (Western) developed an alternative (termed the Sustained Fluctuating Flow Alternative in this document) which would provide some protection to downstream resources, while preserving most of the power generation capacity and flexibility of current operations (No Action)¹. Since there was considerable difference between the R/S, E/RM, and Western proposals, Reclamation developed an alternative (termed the Intermediate Fluctuating Flow Alternative) that sought to balance the overall management responsibilities of the Secretary of the Interior by providing significant protection to downstream resources while also preserving a substantial amount of peaking power.

On July 30, 1991, the Commissioner of Reclamation announced that on August 1, 1991, Reclamation would begin testing proposed interim operating criteria (hereafter called test flows) for Glen Canyon Dam. This testing period was to allow time to more fully evaluate data from the research flows and to carry out NEPA compliance for implementation of interim operating criteria. The test flows are very similar to both the R/S and E/RM Group proposals as shown below.

Table 1.—Parameters of R/S, E/RM, and test flow proposals
(cubic feet per second (cfs) per hour)

Parameter	R/S Group	E/RM Group	Test Flow Proposals
Maximum release (cfs)	20,000	20,000	20,000
Minimum release (cfs)	5,000 (night) 8,000 (daily)	8,000	5,000/8,000
Ramp rates (cfs/hr)			
Up	2,000	2,000	8,000/4 hr; 2,500 max./1 hr
Down	1,000	1,000	1,500
Daily change (cfs)	5,000	5,000	5,000 low months 6,000 med. months 8,000 high months

¹ Due to the court order in the lawsuit, *National Wildlife Federation, et al. v. Western Area Power Administration, et al.*, prohibiting Western from recommending alternative releases from Glen Canyon Dam to Reclamation, Western did not submit a recommendation or alternative *per se*. Rather, Western offered a concept of a different release regime with no recommendation as to its adoption.

Alternatives of the R/S Group, E/RM Group, and Reclamation contributed to the development of the test flows. The test flow proposal recommendations became the Low Fluctuating Flow Alternative in this document.

OTHER RELATED ACTIONS

A number of other current actions also potentially affect the environmental and ecological resources downstream of Glen Canyon Dam.

GLEN CANYON DAM EIS

Glen Canyon Dam was completed in 1963 prior to enactment of the National Environmental Policy Act. In July 1989, the Secretary of the Interior directed Reclamation to prepare an EIS describing and analyzing the environmental impacts of current and alternative Glen Canyon Dam operations on the downstream ecological and environmental resources within Glen Canyon National Recreation Area, Grand Canyon National Park, and affected Indian reservation lands and claims. The EIS will focus on alternative ways of operating the dam that are consistent with the laws of the Colorado River, most statutory requirements for hydropower production, and protection of the area's resources. Other measures—both structural and nonstructural—may be included in the alternatives to enhance existing resources. The action proposed in this EA will provide interim protection to the resources for the short term until the final EIS is completed and a decision is reached on a plan to manage and protect downstream resources.

GLEN CANYON ENVIRONMENTAL STUDIES

Phase I (1982-88) of the GCES began as an interagency effort to study the conditions downstream from Glen Canyon Dam related to whether (1) current dam operations, through control of Colorado River flows, adversely affect the existing river-related environmental and recreation resources, and (2) alternative dam operations, consistent with interstate compact and statutory water storage and delivery requirements, would protect these resources. To accomplish these goals, over 30 technical studies in the fields of biology, recreation, sediment, and hydrology were conducted (U.S. Department of the Interior, 1988). Because of unusual hydrologic and climatic conditions, Phase I could not evaluate the effects of low and fluctuating flows.

Phase II (1988-present) of the GCES was initiated to more fully respond to the initial questions and to provide needed additional information. The schedule for these studies was accelerated with the use of the research flows to better provide data for the EIS.

WESTERN'S EIS

Western is preparing a separate EIS on its Salt Lake City Area Integrated Projects (SLCA/IP) Electric Power Marketing EIS. The criteria will establish the terms of contracts to be used for allocating capacity and energy from the dams of the SLCA Integrated Projects, including Glen Canyon Dam. The purpose of Western's EIS is to

assess the impacts of alternative marketing criteria and programs on powerplant operations and upon the natural and human environment. The EIS will consider issues related to system-wide power marketing and will account for alternative operations of Glen Canyon Dam. The action proposed in this EA is related to operation of the dam and may affect power marketing.

CHAPTER II

PROPOSED ACTION AND ALTERNATIVES

Four actions were considered: No Action, Low Fluctuating Flow Alternative (proposed action), Intermediate Fluctuating Flow Alternative, and Sustained Fluctuating Flow Alternative. The same volume of water on a monthly basis would be released under all alternatives.

The proposed action focuses on limitations in fluctuating powerplant releases. Releases greater than 20,000 cubic feet per second (cfs) may be necessary during higher-than-minimum release years to avoid anticipated spills or equalize storage with Lake Mead. Annual releases greater than 8.23 million acre-feet (maf) will likely be required to equalize storage with Lake Mead in water years 1993 or 1994. Maximum releases would be re-evaluated in cases where annual releases would be greater than 8.23 maf. Limits on ramping rates (the rate of change in instantaneous discharge), range in daily fluctuations, and minimum flows would still apply. Should the Secretary of the Interior decide to make significant changes in these interim operating criteria, additional NEPA compliance would be necessary.

NO ACTION

Annual releases are a function of inflow and space available in Lake Powell. From 1966 to 1989, releases ranged from a minimum of 8.23 to a maximum of 20.4 maf (1984). Monthly and annual releases are scheduled to meet annual downstream release requirements, to avoid spills, to maintain storage, to balance storage between Lake Powell and Lake Mead, and when possible to meet electrical energy loads, recreational demands, and fish and wildlife concerns.

Average monthly releases during a maximum release year have ranged from about 550,000 acre-feet in February to about 900,000 acre-feet in August. When the reservoir is full, scheduled monthly releases for the remainder of the year are recomputed as necessary based on updated streamflow forecast information.

The No Action Alternative would continue the operating practices which were in effect before the initiation of research flows in June 1990. Under those criteria, peak discharges are limited to 31,500 cfs, although full powerplant capacity is 33,200 cfs. These limits are exceeded only when releases are made to avoid anticipated spills. Minimum flows are 1,000 cfs from Labor Day until Easter; from Easter until Labor Day, recreation flows were to average not less than 8,000 cfs from 8 a.m. until midnight and 3,000 cfs during the remainder of the day.

Ramping rates under this alternative would be unrestricted and have been as high as 19,000 cfs per hour; however, typical maximum hourly ramping rates average 4,000-6,000 cfs hourly in a given day. The typical ramping rate is, therefore, about 5,000 cfs per hour.

LOW FLUCTUATING FLOW ALTERNATIVE (PROPOSED ACTION)

This alternative was developed to protect downstream resources. It would permit fluctuating flows for power generation well below existing levels (see table 2 at end of chapter). This alternative reflects release of water from Glen Canyon Dam in a manner that would decrease the magnitude of daily fluctuating flows and ramping rates in order to reduce the adverse effects of current powerplant operations on downstream beaches, sediment-dependent resources, and aquatic resources.

This alternative would limit daily fluctuations to 5,000, 6,000, or 8,000 cfs, depending on monthly release volumes. The maximum flow under a fluctuating flow regime would be limited to 20,000 cfs; any release greater than 20,000 cfs, if required to avoid anticipated spills or in years when the annual release exceeds 8.23 maf, would be evaluated with the Cooperating Agencies (listed in Attachment D, Exhibit A) and the seven Basin States.

Minimum flows would be 5,000 cfs between 7 p.m. and 7 a.m. and 8,000 cfs between 7 a.m. and 7 p.m. (refer to Attachment D, Exhibit D). Ramping rates would be limited to 2,500 cfs per hour for increasing flows and 1,500 cfs per hour for decreasing flows.

The scheduled annual and monthly release volumes would be determined using existing practices based on considerations for maintaining conservation storage, avoiding spills, balancing storage between Lakes Powell and Mead, and when possible, meeting power needs, recreational demands, and fish and wildlife concerns.

EXCEPTION CRITERIA

On October 21, 1991, after extensive consultation with the Cooperating Agencies (listed in Attachment D, Exhibit A) and input by the public, Western's Area Manager and Reclamation's Regional Director signed Interagency Agreement No. 91-SLC-0180 (Attachment D). This agreement sets forth in detail the exception criteria which are summarized below. With the signing of this agreement, the financial exception criteria became an element of the Low Fluctuating Flow Alternative.

Operational Exception Criteria

At times the criteria of the Low Fluctuating Flow Alternative could be exceeded; therefore, the exception criteria would permit the unloaded capacity at Glen Canyon Dam (that operable capacity which is physically available but not presently serving load) to be available to Western (1) for response to system disturbances or other emergency conditions; (2) for system regulation; and (3) as a means of avoiding the expense of purchasing replacement firm capacity and energy.

Items (1) and (2) relate to Western's responsibilities as a member of the North American Electric Reliability Council, the Western Systems Coordinating Council, and the Inland Power Pool. These groups make up an interconnected power system in the

Western United States that ensures the scheduled delivery of power resources to utilities and their consumers in exact amounts, at exact times, at particular voltages, and at a standard frequency (60 cycles per second).

The exceptions to the Low Fluctuating Flow Alternative criteria for system disturbances or other emergency conditions and system regulation were taken into account in the analysis of impacts for the proposed action. Generally, the exception criteria would permit the Low Fluctuating Flow Alternative criteria to be exceeded only for short periods of time, usually less than 1 hour, and almost never exceeding 4 hours.

Financial Exception Criteria Element

Item (3) relates to Western's ability to demonstrate that unloaded capacity at Glen Canyon Dam is available for generation. As demonstrated during the research flows, this does not necessarily mean that such capacity would be used. What is important is that the capacity not be deemed to be unavailable for purposes of meeting *firm load* obligations.

Because these exceptions would be used for financial purposes and not for system disturbances or regulation, Western agreed to several conditions limiting exceedance of the proposed action:

- The interim operating criteria would not be exceeded for more than 3 percent of the time (22 hours) in any consecutive 30-day period, with no carryovers.
- Flows would be bypassed either through the turbines or the outlet tubes to avoid noncompliance with the down-ramp rate and minimum releases.
- Specifics of how to return to the requirements of the interim operating criteria after exceedance are specified in the Interagency Agreement, Attachment D.
- A review of the exception criteria operations would be conducted every 3 months with a view toward necessary changes or possible termination of financial exception criteria.
- These financial exception criteria would not set a precedent for future operations that may result from the GCDEIS.
- Interim operating criteria monitoring would be paid from power revenues. Monitoring would be directed at both the criteria and adherence to the criteria and at the downstream effects of the criteria.
- Cooperating Agencies would review the results of the monitoring program and be informed of any exceedance of the interim operating criteria due to the financial exception criteria.

The financial exception criteria, like the other two exceptions, were taken into account in the analysis of impacts for the proposed action. They would allow the interim operating criteria to be exceeded for relatively short periods of time, but they could be in effect for as long as 12 to 14 hours in a single day.

Monitoring Program

The objective of the monitoring program is to monitor compliance with the operating criteria and to identify and quantify the responses of the ecosystem elements of Glen and Grand Canyons to the interim operating criteria for Glen Canyon Dam. The economic and financial relationships associated with the power and recreation resources will also be assessed.

The monitoring program will focus on the three elements: (1) evaluation of the performance of the interim operating criteria; (2) evaluation of the impacts of the exception criteria on the flows and on the resources; and, (3) evaluation of the general resource responses to the interim criteria. In addition, the following elements will be evaluated: sediment, endangered species, native fish, sediment transport, cultural resources, wetlands, trout, recreation, and economics. A specific timetable and report development process have been developed and will be implemented.

The basis of this monitoring program will be the ecosystem processes and responses. The monitoring program is built around both critical and representative elements already being evaluated through the ongoing GCES research. Due to the limited duration of the interim operating criteria, the focus will be on the short-term responses and the specific ecosystem elements.

An interim flow monitoring plan has been developed and will be integrated with the interim flow program. Specific elements of the monitoring program will be implemented as a part of the GCES research program. No new research efforts are anticipated to support the assessments of the interim operating criteria.

ALTERNATIVES CONSIDERED BUT ELIMINATED

INTERMEDIATE FLUCTUATING FLOW ALTERNATIVE

Intermediate fluctuating flows would require a year-round minimum release rate of 5,000 cfs. The maximum release rate would be restricted to between 20,000 cfs and 22,000 cfs, depending on monthly volume. Restrictions on fluctuations would be imposed each hour, every 4 hours, and each day, again depending on monthly volume. The daily change would be limited to 8,000 cfs in low volume months, 11,000 cfs in intermediate volume months, and 15,000 cfs in high volume months.

Limits on ramping rates would be different for both increasing flows and decreasing flows. Increases in flow would be limited to 8,000 cfs over any 4-hour period and limited to 4,000 cfs in any 1-hour period.

When monthly release volumes are less than 600,000 acre-feet, decreases in flow would be limited to 4,800 cfs over any 4-hour period and limited to 2,000 cfs over any 1-hour

period. When monthly release volumes are greater than 600,000 acre-feet, decreases in flow would be limited to 8,000 cfs over any 4-hour period and limited to 2,000 cfs over any 1-hour period.

This alternative was eliminated from detailed analysis because of the limited resource protection provided and the lack of support from the Cooperating Agencies.

SUSTAINED FLUCTUATING FLOW ALTERNATIVE

This alternative, proposed by Western, would require a minimum flow of at least 3,000 cfs and a maximum hourly decrease in flow of, at most, 5,000 cfs per hour. Western proposed tightening these parameters only if "favorable market conditions exist." There would be no limit on the rate of flow increases. The maximum of 31,500 cfs would be retained.

This alternative was eliminated because it was essentially the same as the existing operation, it did not meet the objective of protection of the downstream resources (see table 2), and lacked Cooperating Agency support.

ENVIRONMENTAL IMPACTS

Table 3 compares summaries of assessed impacts to various resources under the No Action and Low Fluctuating Flow Alternatives. Detailed treatment of environmental impacts follows in chapter III.

**Table 2.—Glen Canyon Dam
alternatives for interim operations
(in cubic feet per second (cfs))**

PARAMETER	ALTERNATIVES				CONSIDERED BUT ELIMINATED
	No Action	Low Fluctuating Flow	Intermediate Fluctuating Flow	Sustained Fluctuating Flow	
Maximum release (cfs)	31,500	20,000	20,000-22,000 (depending on monthly vol.)	31,500	
Minimum release (cfs)	3,000/summer 1,000/winter	5,000/night 8,000/day	5,000	3,000	
Maximum rate of fluctuation (ramp rate) (cfs)	Ascending				
	No limit	8,000/4 hr Not to exceed (NTE) 2,500/hr	8,000/4 hr NTE 4,000/hr	No limit	
	Descending				
Maximum Daily change (cfs)	No limit	1,500/hr	Low vol.: 4,800/4 hrs NTE 2,000/1 hr Medium and high vol.: 8,000/4 hr NTE 2,500/1 hr	Low vol.: 4,000/hr. High vol.: 5,000/hr	
	30,500	5,000 low vol. month ¹ 6,000 med. vol. month ¹ 8,000 high vol. month ¹	8,000 low vol. month ¹ 11,000 med. vol. month ¹ 15,000 high vol. month ¹	No limit	

¹ Low monthly volume: less than 600,000 acre-feet; medium monthly volume: 600,000 to 800,000 acre-feet; high monthly volume: over 800,000 acre-feet.

Table 3.—Comparison of environmental impacts

RESOURCE	NO ACTION = EXISTING ENVIRONMENT	LOW FLUCTUATING FLOWS
SEDIMENT	No change - continued beach erosion and a net accumulation of sand in main channel pools and eddies	Decreased rates of beach erosion and increased rates of sand accumulation in main channel pools and eddies
VEGETATION	No change - OHWZ ¹ - decline in areal coverage NHWZ ² - continued development Fluctuating zone - unstable	OHWZ - no change NHWZ - minimally beneficial Fluctuating zone - minimally beneficial
WILDLIFE (HABITAT)	No change - OHWZ - decline in areal coverage NHWZ - continued development Fluctuating zone - unstable	OHWZ - no change NHWZ - minimally beneficial Fluctuating zone - minimally beneficial
FISH	No change - Native fish - rapid flooding/ dewatering of backwaters impacts young Trout - redds dewatered by low flows; adults stranded by rapid down-ramping	Native fishes - no change to minimally beneficial Trout - minimally beneficial
THREATENED AND ENDANGERED SPECIES	No change - Birds - dependent upon river productivity (insects and trout) and riparian habitat Fish - dependent upon temperature and seasonal flow regimes	Birds - no change to minimally beneficial Fish - no change to minimally beneficial
CULTURAL RESOURCES	No change - exposure of site foundations to erosion and exposure and scouring of historic boat remains	Decreased site erosion and virtual elimination of exposure and scouring of historic boat remains
RECREATIONAL RESOURCES	No change - fishing, day-rafting, and white water recreationists exposed to unpredictable flow fluctuations	Reduced flow fluctuations improve day-use rafting and white water rafting; improved safety, accessibility, and wilderness values
HYDROPOWER RESOURCES	No change - continued pattern of wide hourly, daily, and seasonal flow fluctuations for power optimization	Decreased on-peak generation, minor system-wide increased power production costs. Reduced ability to respond to power system demands, estimated increased energy purchase costs of \$3 million per year.

¹ Old high water zone influenced by historic flooding.

² New high water zone influenced by dam's control of historic flooding and by fluctuations providing water to higher areas.

CHAPTER III

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the general setting and existing environmental resources and analyzes the impacts of implementing the proposed interim operating criteria. The existing conditions described are the No Action Alternative and serve as the baseline for the determination of the effects of the proposed action.

ASSUMPTIONS

The analysis of impacts in this chapter is based on the following assumptions:

- Since the monthly and annual release volumes would be the same under all alternatives, there would be no impacts to lake elevations, water quality, recreation, and fisheries in Lakes Powell and Mead.
- Lake Powell is currently drawn down about 70 feet (lake elevation 3,630 feet) or 9.6 maf from full reservoir. The probability of filling the reservoir over the next 3 years is about 15 percent. The projected releases for water year 1992 are 8.23 maf. The monthly release volumes are shown on figure 2. Annual releases in excess of 8.23 maf will likely be necessary to equalize storage with Lake Mead in 1993 or 1994.
- Based upon historical operations, the range in daily fluctuations is greatest when the monthly release volume is about 1 maf. This release volume also results in the greatest difference in environmental impacts between alternatives. Therefore, in this EA monthly release volumes from Glen Canyon Dam of 1 maf or less have been used as the basis for the assessment of impacts. As monthly release volumes increase above 1 maf, flows and resulting impacts of the two alternatives tend to be the same.
- Biological and physical resources are linked, with sediment as the key parameter; therefore, impacts on biological resources would, in general, follow impacts on sediment. In addition to this key linkage, aquatic resources may also be modified by other parameters such as water temperature, hydrology, and exotic fishes.

Based on these assumptions and the interim operating criteria, the projected monthly release volumes are shown on accompanying figure 2.

GLEN CANYON MONTHLY RELEASES

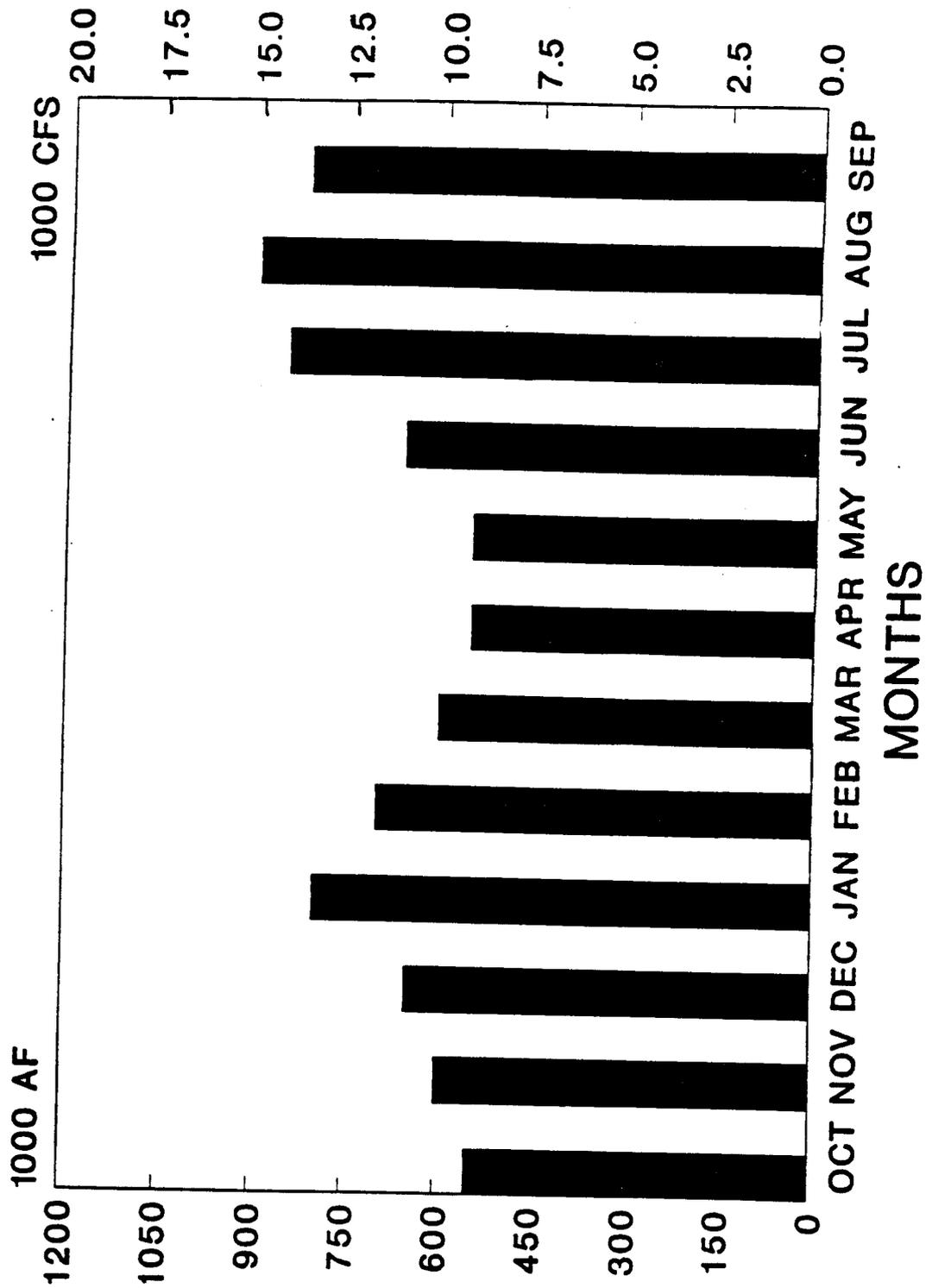


Figure 2

LOCATION

The affected area analyzed in this EA can be viewed from two perspectives—that of the immediate Colorado River area and that of the adjacent area of general influence (see figure 3). (See Letter of Comment, Attachment E.)

Immediate Area

This area encompasses the Colorado River and adjoining canyon areas in northwestern Arizona between Glen Canyon Dam and Separation Canyon near the inflow to Lake Mead, including the Grand Canyon, as shown on figure 3. While nearly all the area is within Grand Canyon National Park, parts of both Glen Canyon National Recreation Area and the Navajo, Havasupi, and Hualapai Indian Reservations could also be affected. Physical, biological, cultural, or recreation-related impacts would be limited to this area. In addition, other Native American tribes such as the Hopis do not have reservation lands adjacent to the river but have religious ties to the impact area.

Area of General Influence

This area equates to the wider area of influence of the water and power resources of Glen Canyon Dam. The area encompasses the six western states served by Western: Arizona, Utah, Wyoming, Colorado, New Mexico, and Nevada. Hydropower-related impacts would occur in this area.

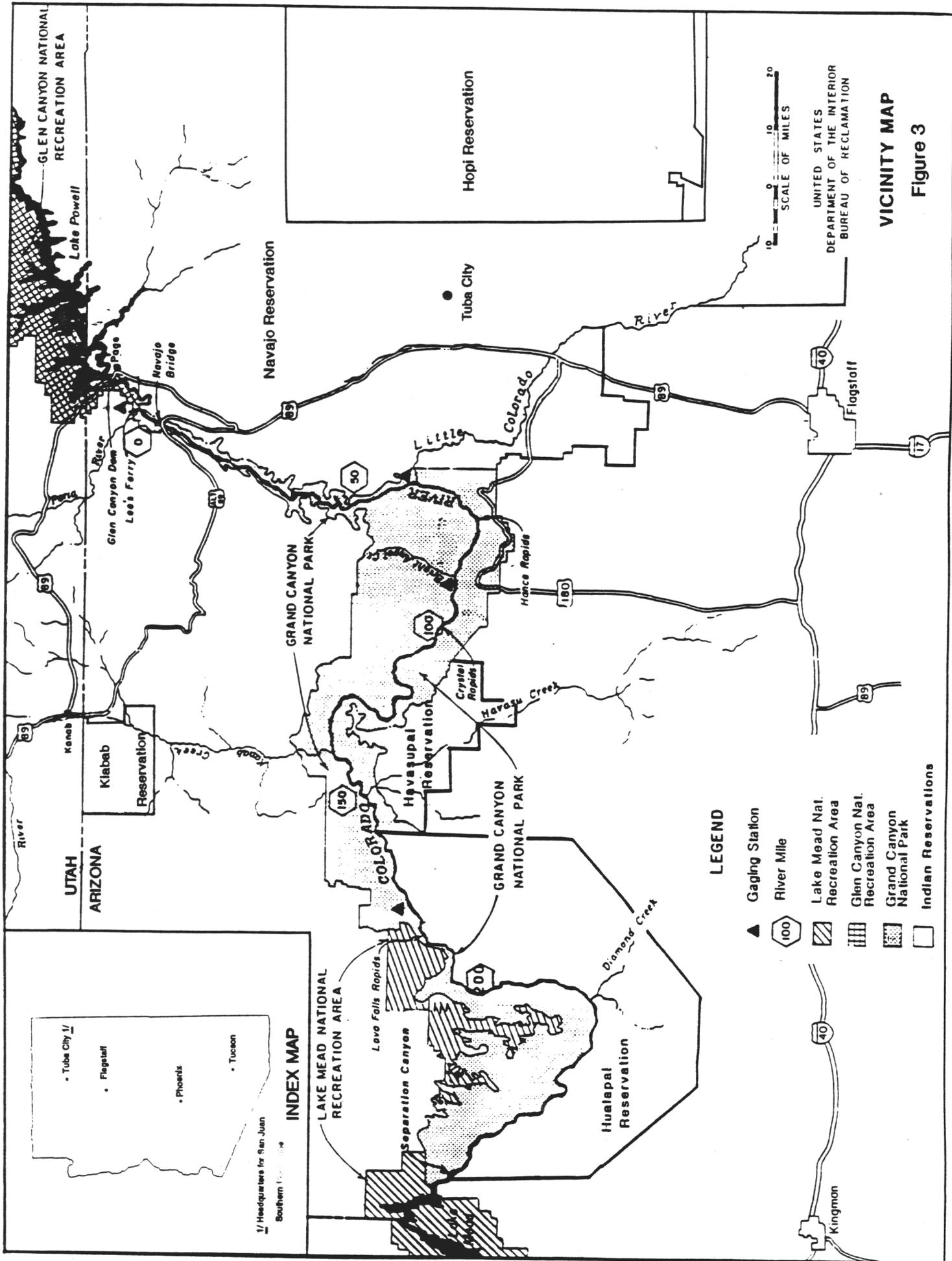
COLORADO RIVER FLOWS

Glen Canyon Dam has had a significant effect on downstream resources. Before the dam was completed in 1963, the river reached a maximum flow in May or June, then receded during the remainder of the year. Since 1963, the flow below the dam has been primarily dependent on the release of water from Lake Powell. The regulation of flow by Glen Canyon Dam has resulted in a slight increase in intermediate flows and a great decrease in the number and magnitude of annual flood peaks. Fluctuating releases are made when the dam is being operated to produce peaking power. Since demands for hydroelectric power determine the hourly schedule of discharges, the dam releases vary over a 24-hour cycle.

RESOURCES

Some resources would not affect or be affected by the proposed action. These resources, which will not be discussed, include: climate, geology/topography, aesthetics, water supply, water quality, and air quality.

The parameters analyzed are those relating to sediment, biology, cultural resources, recreation, and hydropower resources. The effects of the alternatives on each resource are shown in table 3 (page II-7).



The resources are primarily analyzed qualitatively; when quantitative data were available, they were included.

SEDIMENT

Sediment deposits (beaches) exposed along the Colorado River corridor are the foundation for the biological and recreational resources of the river through Glen Canyon National Recreation Area, Grand Canyon National Park, and Indian reservation lands or claims. Sediment is required to sustain backwater habitats and is necessary as substrate for vegetation. It is also critical to the stability of archaeological sites and the maintenance of camping sites.

Current maximum water releases are significantly less than the peak floodflows that occurred before construction of the dam. Therefore, the river's capacity to transport sediment has been reduced along with the sediment supply, though the clear-water releases from the dam are erosive. The only sources of sediment that resupply sand to the river below Glen Canyon Dam are the tributaries, with the primary sources of sand being the Paria and Little Colorado Rivers and Kanab Creek. The long-term average annual sand load from all tributaries within the Grand Canyon is estimated at 3.7 million tons per year (mty) (Randle and Pemberton, 1988).

Following construction of Glen Canyon Dam, downstream beaches were significantly eroded from 1965 to the early 1970's, but the rate of erosion substantially declined by the late 1970's (Schmidt and Grams, 1991). Carothers and Brown (1991) stated that "Only slight changes in the beach profiles were recorded during the period 1974 to 1982. Some beaches lost up to 3 vertical feet of sand while others actually gained 1 to 2 feet. Overall, slightly more sand was lost than gained, suggesting a slow and gradual depletion of sand from the beaches that were studied." The high flows in 1983-84 redistributed sand in Grand Canyon and deposited sand at some frequently-used campsites (Schmidt and Grams, 1991). There was a tendency for major deposition on the upper beach terraces, while lateral erosion cut the lower face of the beach away (Carothers and Brown, 1991). High rates of bank retreat were observed during the 3.5 months of fluctuating releases between October 1985 and January 1986 (Schmidt and Grams, 1991)

AFFECTED ENVIRONMENT/NO ACTION ALTERNATIVE CONSEQUENCES

The following discussion is based on the GCES report: "Interim Flows for Grand Canyon, Recommendations for Interim Operating Procedures for Glen Canyon Dam," (U.S. Bureau of Reclamation, 1991.)

Erosion of Sand Bars

The No Action regime of fluctuating flows has been shown to cause erosion of the sand bars, beaches, and other sediment deposits. The range of daily fluctuations in discharge, the rate of the changes in daily discharges, and the maximum daily discharge are significant factors affecting erosion rates.

Daily Discharge Fluctuations.—Some of the greatest flow fluctuations occur in the month of August (typically one of the highest volume release months). The average daily change in flow for the month of August has been 14,900 cfs for the period 1966-89. This is based upon average minimum releases of 8,700 cfs and maximum releases of 23,600 cfs. The corresponding change in river stage (assuming no flow attenuation) at Colorado River gauging stations is 4.8 feet below Glen Canyon Dam, 2.9 feet at Lees Ferry, and 6.5 feet near Grand Canyon. The range of daily fluctuations in discharge increases sand bar and beach erosion in an exponential relationship to the magnitude of fluctuation. In other words, a constant daily discharge causes the least erosion, and increasingly wide fluctuations in instantaneous discharge cause progressively larger rates of erosion. Erosion of beach deposits occurs primarily when the area of the recirculating zone decreases and the deposit of sand (beach) is exposed to the primary downstream current (see figure 4). The area of a recirculating zone is determined by local channel topography and discharges. As discharge decreases, the point at which the primary downstream current reattaches to the bank moves upstream. The zones of recirculating flow (eddies) where the sand bars are deposited decrease in size, and a portion of the channel which was previously within the recirculating zone is exposed to the much higher flow velocities of the primary downstream current. The downstream acceleration of flow along the bank can result in direct erosion of sand banks or the erosion of sand which slumps into the channel from higher elevations. Erosion of areas downstream from the reattachment points was described by Schmidt and Graf (1990). Sand transported by relatively high-velocity main channel flows would likely deposit in the slower velocity recirculating zones. Beaches or sand bars may rebuild when flows are greater than normal maximum powerplant releases for a duration of 1 to 2 weeks.

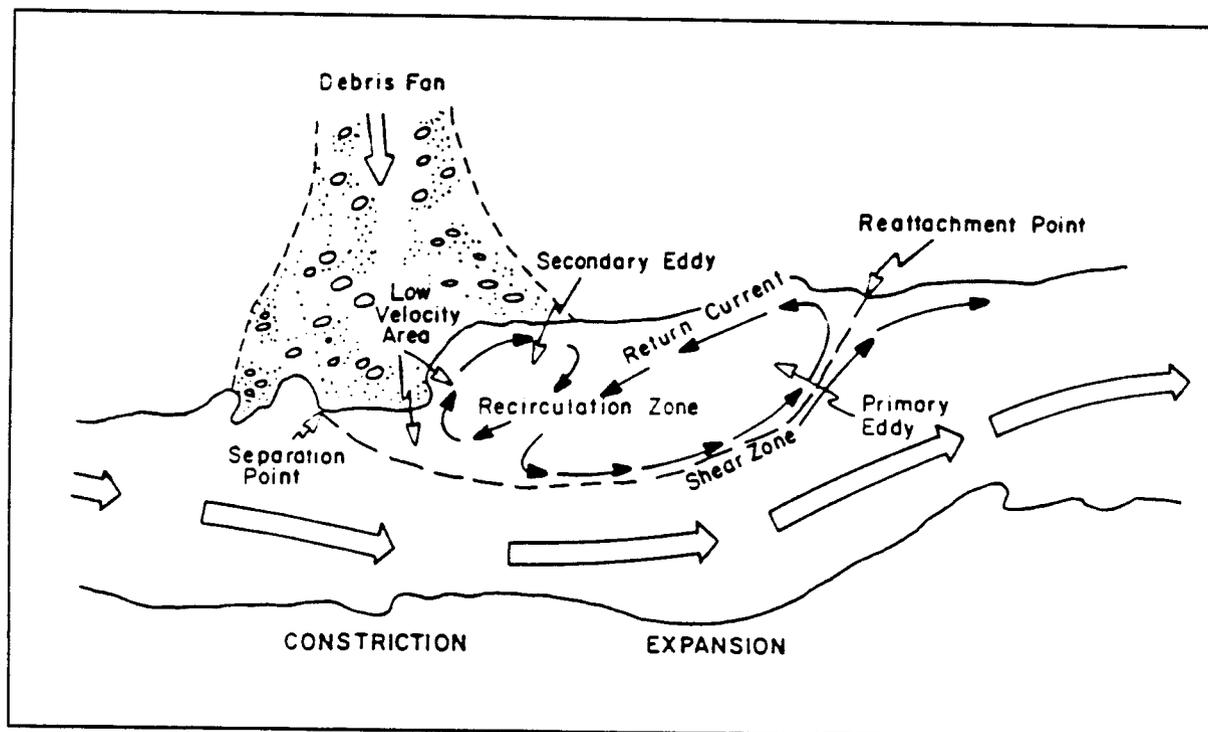


Figure 4.—Flow patterns in a typical recirculation zone.
(From Schmidt and Graf, figure 3A, 1990.)

Discharge Change Rate.—The ramping rate also has been shown to influence the erosion rate of the sand bars and beaches—the steeper the ramping rate, the greater the rate of material removal. A ramping rate of 3,600 cubic feet per second per hour (cfs/hr), which was used as the "low" ramping rate under the 1990-91 research flows, produced considerable erosion. This rate is actually closer to intermediate to high ramping rates under normal operations. Down-ramping has a much greater influence on sand bar and beach erosion than up-ramping. A rapid decrease in river stage leaves the sand bar saturated with excess water, which will then seep from the deposit causing rill erosion, reducing the effective strength of the sand bar and promoting bank failure. This seepage-driven erosion appears greatest when Glen Canyon Dam ramping rates exceed 1,000 to 2,000 cfs/hr for decreasing flows. Maximum daily ramping rates exceeded 5,000 cfs/hr (1-hour duration) about 50 percent of the time between 1965-90. Ramping rates for a 3-hour period exceeded an average of 3,000 cfs/hr about 50 percent of the time for the same period.

Maximum Daily Discharge.—The maximum discharge determines the highest river stage in which sediment transport and depositional processes occur. The daily ebb and rise to this maximum discharge will cause erosion of yet higher sand deposits created during the very high flow years of 1983-1986. Preliminary data indicate that discharges above 20,000 cfs accelerate erosion of perched beach sand deposits and cause lateral bank erosion. Reconnaissance observations made in 1990 and 1991 indicate that discharges of about 20,000-22,000 cfs will begin to erode the base of the high flow deposits.

Replenishment of Sand Bar Deposits

Erosion of sand bar deposits can occur under any flow conditions. Therefore, replenishment of sand and rebuilding sand bars is essential to maintaining this resource. Replenishment of sand bar material lost to erosion requires an available supply of sand in the river reach and a sufficient flow to deposit sand to an elevation above the normal river stage.

Available Sand Supply.—The quantity of sand stored in a given river reach, and thus available for deposition on sand bars, depends upon the supply of sand to the reach from the upstream channel and tributaries and the rate at which sand is removed from the reach by transport downstream.

Randle and Pemberton (1988) and Pemberton (1988) calculated the supply of sand to reaches of the Colorado River through Grand Canyon National Park. On average, 1.1 million tons of sand annually are supplied to the reach between the Paria and the Little Colorado Rivers, and 1.5 million tons of sand, on average, are supplied to the reach between the Little Colorado River and the U.S. Geological Survey (GS) gauge just above the mouth of Bright Angel Creek (Grand Canyon gauge) (Randle and Pemberton, 1988). The actual supply of sand from the tributaries is highly variable. For example, the amount of sand delivered from the Paria River is estimated to be 4.0 million tons in 1980 but only 0.13 million tons in 1985.

River Flow.—The amount of sand transported by the main channel is proportional to the river flow raised to the third or fourth power. A steady constant flow of 11,387 cfs (8.23 maf per year) will transport approximately 200,000 tons of suspended sand per

year at the GS gauge near Grand Canyon. The same annual flow (8.23 maf) with daily fluctuations of the No Action-operating regime would transport approximately 500,000 tons per year of suspended sand past the gauge near Grand Canyon. This 250 percent increase in annual suspended sand load by the same annual flow is due to the exponential increase in transport with discharge. Assuming an average inflow of sand from the Paria and Little Colorado Rivers of 2.6 million tons, the amount of sand stored in the river channel pools and eddies would be 2.4 million tons under steady flow and 2.1 million tons under the No Action Alternative, a difference in storage of 13 percent. Sand that has aggraded in the channel pools and eddies may be available to rebuild beaches and sand bars during periods of high releases.

LOW FLUCTUATING FLOW ALTERNATIVE CONSEQUENCES

Erosion of Sand Bars

Under this alternative the rate of beach erosion would be less than under the No Action Alternative. The upper range of fluctuations would be from 12,000 cfs to 20,000 cfs under normal operations. The shape and size of recirculation zones would be more stable throughout a 24-hour period, and less sediment would be eroded from these zones than under the No Action Alternative. Flows greater than 20,000 cfs could be released under emergency conditions for short periods of time. Maximum discharges could be as high as 30,000 cfs with durations ranging from a few minutes to about 2 hours. Peak releases of short duration would be expected to attenuate rapidly downstream with the greatest impacts occurring in the reach upstream from Lees Ferry. The greatest impact of these emergency operations would occur during times of rapidly decreasing flow coupled with a decrease in flow of more than 8,000 cfs over a 24-hour period. The consequences of these emergency releases would be of a similar nature to consequences under the No Action Alternative. However, the cumulative impact of these events is thought to be minor, because they would occur infrequently and because of rapid attenuation downstream.

The average daily change for the month of August under the Low Fluctuating Flow Alternative would be 8,000 cfs. During the August 1991 test flows, releases typically ranged from 10,000 to 18,000 cfs. The corresponding change in river stage at Colorado River gauging stations is 2.7 feet below Glen Canyon Dam, 1.5 feet at Lees Ferry, and 3 feet near Grand Canyon. This relatively narrow range in river stage fluctuations would reduce the amount of excess water pressure within a saturated sediment deposit and thus reduce the potential for bank erosion. Also, the maximum rate at which the flow would decrease (1,500 cfs/hr) under this alternative would more closely match the rate at which the ground-water elevation in a sediment deposit can respond to changes in river stage. This would lessen the potential for seepage-based erosion relative to the No Action Alternative.

Replenishment of Sand Bar Deposits

With this alternative the amount of sediment transported by the river would be less, and the quantity of sand stored in the river channel pools and eddies would be greater than under the No Action Alternative. The Low Fluctuating Flow Alternative would transport about 250,000 tons of suspended sand per year past the Grand Canyon

gauging station. The river channel pools and eddies would store 2.4 million tons of sand, assuming an average tributary inflow of 2.6 million tons. This amount is one-half of the sediment transported under the No Action Alternative. Both the Low Fluctuating Flow and the No Action Alternatives would allow the river channel pools and eddies (between the gauges at Lees Ferry and above Little Colorado River) to accumulate sand in years when annual releases from Glen Canyon Dam are less than 12 maf (Randle and Pemberton, 1988). However, the river channel would aggrade at a faster rate under conditions of the Low Fluctuating Flow Alternative when compared to the No Action Alternative.

Channel aggradation of pools and eddies is important in the rare context of spills. Sand that is stored in channel pools may be available for transport during spills and may result in aggradation of sand bars and other sediment deposits with less accompanying impact on the remaining beaches. Although spills may be considered damaging to most downstream resources (U.S. Department of the Interior, 1988), spills are less damaging and are perhaps beneficial when sand bars can be rebuilt with sand that previously accumulated in the channel. However, when the channel is depleted of sediment, spills of the same magnitude would be expected to have the opposite results. The clear water would erode sediment deposits. Infrequent emergency operations would have almost no impact on the annual sand-load of the river or the quantity of sand stored in the channel.

Financial Exception Criteria Element

A small increase in the frequency of flows greater than 20,000 cfs (less than 3 percent) could occur under this condition of the Low Fluctuating Flow Alternative. The greatest impact of these operations would occur during times of decreasing flow coupled with a decrease in flow of more than 8,000 cfs over a 24-hour period. The consequences of these releases could be similar to consequences under the No Action Alternative depending on the nature of the increase in flows. However, the cumulative impact of flows under financial exception criteria is much less than under the No Action Alternative since the frequency of their occurrence is limited to 3 percent of the time.

BIOLOGICAL RESOURCES

VEGETATION

Affected Environment/No Action Alternative Consequences

Plant communities affected by releases from Glen Canyon Dam are located in a restricted zone adjacent to the Colorado River. This riparian zone exists in the interface between the river's strictly aquatic communities and upland plants adapted to desert conditions. The availability of water at this zone, as at other riparian communities in the region, permits support of plants that could not otherwise survive in a desert climate.

Riparian zones are dynamic, adjusting to the range of physical and biological conditions that constrain them. For example, following completion of Glen Canyon Dam, riparian vegetation at selected sites increased at the rate of 1/2 acre per river mile per year

between 1965 and 1973 (Pucherelli, 1986). Between 1973 and 1980, the rate of increase slowed to 1/4 acre per mile per year. Riparian development was interrupted and perhaps redirected by high flood flows in 1983. Riparian vegetation within the Grand Canyon is advancing toward an equilibrium following the flood flows of the 1980's, but the future composition of this zone is unknown (Carothers and Brown, 1991).

Vegetation functions in bank stabilization by trapping sediments during high flows while nutrients within the sediments become available for plant growth. Different plant species and robust growth provide a structural diversity that makes riparian zones some of the most important wildlife habitat in the region. Riparian vegetation supplies cover and food for the abundant insects hatching and emerging from the river and, in turn, supports numerous mammals, birds, reptiles, amphibians, and invertebrates (Carothers and Brown, 1991). Additional species rely on organisms produced in riparian zones as prey items.

Woody Plants.—Both native and exotic woody plants are important components of riparian zones along the Colorado River. Vegetation found within the old high water zone (OHWZ) was historically influenced by high spring flows and also reflects historic and current regional climates. The zone is characterized by plants that require periodic flooding and can reach the water table. For example, the OHWZ is dominated by netleaf hackberry in upper reaches of Marble Canyon with honey mesquite and catclaw acacia most common in the lower reaches of the river. Mesquite and acacia have long taproots that anchor the plants in place during flood flows and reach water tables during lower flows.

Current dam operations affect plants in the OHWZ by reducing the frequency and magnitude of flood events (flows greater than 31,500 cfs). Without periodic inundation, plant germination in the OHWZ is limited and growth of established plants is affected. The OHWZ is declining in areal coverage (U.S. Bureau of Reclamation, 1991), and dying trees are evident along some river reaches. It is assumed that upland plants will move into sites that can no longer support OHWZ vegetation.

The new high water zone (NHWZ) exists from the OHWZ down to approximately the 30,000-cfs flow stage. Common woody plants include both native and exotic species: seep-willow, arrowweed, desert broom, coyote and Goodding willow, and tamarisk (Carothers and Brown, 1991). Some invasion of honey mesquite and catclaw acacia into the NHWZ from the OHWZ is occurring. NHWZ vegetation is the most valuable component of the riparian zone as wildlife habitat.

Emergent Vegetation.—Emergent vegetation can be found along some beaches, associated with some backwaters, and in other isolated sites within the fluctuating zone, or the area currently influenced by fluctuating flows. Common species include cattails, scouring rush, bulrush, and other rushes. Coyote willow, arrowweed, and seep-willow are often associated with such sites. Tamarisk is also common in the fluctuating zone. Although emergent vegetation in the Grand Canyon occupies a small number of total acres when compared to beaches and woody riparian communities, the abundant organic matter and dense vegetation of marshes support rich insect populations important in numerous food chains throughout the canyon. For example, 1 acre of marsh would be expected to produce insect biomass equivalent to production from several miles of river channel.

Another result of reductions in flood events would be the continued establishment of riparian vegetation in the NHWZ and fluctuating zone. However, interpretation of this trend is complicated by daily fluctuations in flows. Although relationships between vegetation and operational flows are still under investigation, researchers with GCES believe that flows greater than 20,000 to 22,000 cfs cause accelerated erosion of high beaches (U.S. Bureau of Reclamation, 1991). The erosion affects such shallow-rooted plants as arrowweed, coyote willow, giant reed, and cattail.

Low Fluctuating Flow Alternative Consequences

This analysis assumes no flood releases (flows greater than 31,500 cfs) in the short term (3 years). The Low Fluctuating Flow Alternative would, therefore, contribute to the continued decline of OHWZ vegetation over an extended period, but it is not expected to increase the rate of decline in the short-term interim-flow period over No Action conditions.

Vegetation within the NHWZ and fluctuating zone would benefit from the proposed interim flows. Flood releases are not expected to occur within the next 3 years because of the reduced level of Lake Powell. A maximum flow of 20,000 cfs would be below the level at which accelerated beach erosion begins, and reduced ramp rates would decrease the incidence of beach calving and beach-face wasting (U.S. Bureau of Reclamation, 1991).

A zone between 20,000 and 31,500 cfs would no longer be inundated by fluctuating flows. This change in flow would translate into different stage changes depending upon the width of the channel. For example, at Lees Ferry, a "wide" location, the maximum stage change would be approximately 1.6 feet. At the Grand Canyon gauge, a "narrow" location, the maximum stage change would be some 3.5 feet. These changes would be attenuated downstream and reflected as less stage change at corresponding wide and narrow locations. It is assumed that this change in water regime would affect current and future plant species composition and abundance. For example, riparian species that reproduce by seed dispersal timed to coincide with favorable moisture conditions associated with occasional flooding may not increase in abundance during the next 3 years. Clonal species, such as coyote willow, that spread by subsurface roots may increase in the same time period. Tamarisk, a species producing abundant seeds, may increase in abundance, but at a slower rate than present conditions.

Marshes or emergent vegetation dependent upon a water supply provided by flows above 20,000 cfs would be adversely affected by the proposed action.

The specific changes that would occur in riparian communities under proposed action conditions are unknown. It is assumed that the proposed action would improve conditions, when compared to No Action, for beaches and thus vegetation associated with the NHWZ and fluctuating zone. Ongoing research and monitoring during the proposed action would continue to evaluate species composition, abundance, and other parameters of riparian communities. It is assumed that in 3 years, under proposed action conditions, minor changes would occur in species composition and abundance, with a minimal net increase in woody riparian vegetation over No Action conditions.

Financial Exception Criteria Element.—Deviations from the proposed minimum and maximum flows and ascending and descending ramp rates are possible under these criteria. However, water would be bypassed to avoid noncompliance with minimum flow and descending ramp-rate criteria identified in the Low Fluctuating Flow Alternative. The deviation of concern becomes flows above 20,000 cfs. These deviations would be permitted up to 3 percent of the time in any consecutive 30-day period (22 hours).

Even if fully implemented, financial exception criteria represent a very large reduction in exposure of the riparian zone between 20,000 and 31,500 cfs to fluctuating flows. Under full usage, it is assumed that such deviations for limited periods would not adversely affect riparian vegetation when compared to No Action conditions. Occasional inundations of vegetation above the 20,000 cfs stage may be beneficial depending upon circumstances.

WILDLIFE

Affected Environment/No Action Alternative Consequences

Carothers and Brown (1991) list 114 species of amphibians, reptiles, birds, and mammals (river otter excluded) that inhabit the river corridor. Of these, only the Canyon treefrog, white-throated woodrat, desert woodrat, and 17 birds do not use riparian vegetation as habitat. Thirty-five species are recorded only in the riparian zone.

The importance of riparian vegetation as wildlife habitat, specifically the NHWZ, is readily exemplified by bird use. Of the 114 species listed by Carothers and Brown (1991), 51 are birds. Some 15 species use both the OHWZ and NHWZ, with an additional 12 species restricted to the NHWZ. Only three species use the OHWZ exclusively. Four species—Bell's vireo, summer tanager, hooded oriole, and great-tailed grackle—have expanded their nesting ranges into the Grand Canyon in response to increases in riparian vegetation (Carothers and Brown, 1991). Lizards are more abundant in the NHWZ than in any other canyon habitat type.

Wildlife use of the fluctuating zone is generally limited to foraging because of flow-stage fluctuations. Some lizard species, such as the western whiptail, exploit the "intertidal" area of fluctuating flows for emerging insects, stranded invertebrates, *Gammarus*, and other food items (Carothers and Brown, 1991).

Low Fluctuating Flow Alternative Consequences

Because wildlife along the river corridor is so closely tied to the habitat requirements supplied by riparian vegetation, it is assumed that impacts to riparian vegetation can be used to represent impacts to wildlife habitat.

One of the most important events in recent history in the Grand Canyon was the high flood flows of 1983. These flows affected beach deposits, riparian vegetation, and wildlife using these sites as habitat. Where vegetation was removed, habitat was removed, and many species are still adjusting to those changes (Carothers and

Brown, 1991). As under the No Action Alternative, the projected absence of flood flows during the interim period would permit continued adjustments toward post-flood equilibrium in habitat and wildlife populations.

The proposed action would not accelerate the rate of decline currently experienced by the OHWZ under the No Action Alternative.

Reduced beach erosion under the Low Fluctuating Flow Alternative would provide improved conditions for riparian vegetation and thus for wildlife habitat and wildlife in the NHWZ and fluctuating flow zone. A minimal improvement in wildlife habitat conditions is assumed in the short term as compared to No Action conditions.

Financial Exception Criteria Element.—Wildlife resources and critical periods identified during discussions of interim flows include waterfowl and passerine birds during the May through June annual nesting season (see interagency agreement attachments). Deviations of concern involve flows greater than 20,000 cfs that could potentially flood nests.

Ground-nesting birds, predominantly waterfowl, with nests in the zone between 20,000 and 31,500 cfs would be at most risk from high flows. The number of waterfowl nests potentially affected is unknown, but waterfowl production in the Grand Canyon is assumed to be low. Some nests may be lost, but waterfowl do renest if the opportunity is available. In the most extreme case, some production could be lost, but habitat potential would remain. It is assumed that financial exception criteria would not cause adverse affects on nesting birds in the short term (3 years) when compared to No Action conditions.

FISH

Affected Environment/No Action Alternative Consequences

Native Fishes.—Two native fishes, the speckled dace and bluehead sucker, are common in the Colorado River below Glen Canyon. They spawn in the mainstem and tributaries from late spring to early summer (Maddux et al., 1987). Spawning often occurs over shallow gravel bars, particularly for bluehead suckers. Flow fluctuations subject these areas to dewatering with resulting high mortality of eggs and larvae. Backwaters are attractive to early life stages of these species because of their low velocity and higher temperatures. Rapid down-ramping from Glen Canyon Dam strands native fishes in backwaters, and high flows inundate backwaters, forcing fish into suboptimal habitats where they are susceptible to predation and excessive energy expenditures.

Rainbow Trout.—Although rainbow trout have been stocked in the Grand Canyon since the 1920s, habitat was not favorable in the Colorado River until closure of Glen Canyon Dam provided clear and cold-water releases. Since then, the 15-mile reach from the dam to Lees Ferry has become a renowned trout fishery (Carothers and Brown, 1991). Ongoing stocking programs are necessary to maintain the current fishery, although some spawning occurs. Fluctuating flows of the No Action Alternative adversely affect spawning.

Like native fishes, trout are susceptible to stranding from rapid down-ramping. Strandings are most common during the spawning season (December through March) because trout are reluctant to abandon their spawning beds (U.S. Department of the Interior, 1988). As flows increased above 12,000 cfs in the Lees Ferry reach, trout-fry habitat decreased to the point that at 25,000 cfs virtually all habitat was gone.

The existing flow regime also impacts the trout population by dewatering spawning beds, resulting in extensive mortality to eggs and young, and the freezing or desiccation of *Cladophora* during extended low flows. Flows of at least 8,000 cfs are required to prevent dewatering of spawning sites (Persons et al., 1985). Current minimum flows range between 1,000 and 3,000 cfs. Fluctuations do, however, benefit the trout population by dislodging the filamentous algae *Cladophora* and its associated invertebrates such as *Gammarus*. This drift becomes an important food source for downstream trout.

Low Fluctuating Flow Alternative Consequences

The frequency and duration of flows which have adverse impacts on fishes constitute the principal difference between the No Action and proposed action scenarios. Water chemistry and temperature regimes in the main channel are not expected to differ between the two alternatives.

Native Fishes.—Several studies concerning aspects of native fish biology are currently under way in the Grand Canyon, and the results should improve our understanding of the relationships between native fish and their habitat. In general, this evaluation assumes that factors affecting backwaters also affect native fishes through changes in their habitats. This is a gross simplification of a complex system. Thermal regimes, the absence of high spring flows, the invasion of exotic fishes, and other factors are probably as important to native fish habitat suitability as sediment distribution. The following evaluation will briefly address temperature and exotic fish issues, but the assumed absence of high spring flows in the No Action Alternative would also continue under the Low Fluctuating Flow Alternative and is not discussed.

The proposed action would not affect water temperature in the channel, but may influence backwater temperatures. Constraints on ramp rate may increase differential warming in backwaters over the No Action condition.

Decreased fluctuations associated with the proposed action would increase the longevity of backwaters essential to young-of-the-year native fishes. Mortality of the early life stages is expected to be lower than under existing conditions because zooplankton would be more abundant and water temperatures warmer. The proposed action would provide a more favorable habitat during the early life stages that are typically a period of high mortality. Thereafter, young-of-the-year are better adapted to conditions in the channel.

There is some concern that reducing the magnitude of fluctuations in flows would permit the invasion of exotic fish species or the spread of predators of native fishes already in the system. High fluctuating flows may be one of the factors affecting habitat suitability for exotic fishes. Another factor is water temperature that would not be affected by the proposed action. It seems unlikely that a change in flow regime

alone would permit exotic species to increase to the point of serious impact to native fish populations during the short-term (3 years) duration of the proposed action.

In summary, the Low Fluctuating Flow Alternative may result in some warming of backwaters due to reduced ramp rates, assure access to tributaries and other spawning sites through increased minimum flows, and afford increased stability to backwaters through a narrower range in fluctuations when compared to the No Action Alternative. The potential impact of exotic fish on native fish populations resulting from reduced fluctuations is unknown, but is assumed to be nonexistent or minimally adverse in the short term. Overall, however, these changes are expected to create conditions that either do not adversely affect (no change) or are minimally beneficial to native fish habitat when compared to the No Action condition.

Rainbow Trout.—High daily fluctuations may dislodge increased quantities of *Cladophora* and associated invertebrates that would not be available under lower flow regimes. This drift is an important food source for downstream trout. A decreased range in fluctuations and constraints on ramp rates under the proposed action may decrease drift and lower the availability of this food source to downstream trout. The magnitude of change and the effects of such a change on downstream trout are unknown.

Under existing conditions, rapid descending ramp rates can strand trout, while low flows dewater redds (spawning beds) and result in the loss of habitat (U.S. Bureau of Reclamation, 1991). By moderating minimum and maximum flows, the proposed action would increase trout fry habitat and reduce the likelihood of dewatering spawning sites. The trout population would benefit by greater spawning success and early life stage survival. Higher minimum flows (5,000/8,000 cfs) of the Low Fluctuating Flow Alternative would provide some protection from freezing and desiccation of *Cladophora* beds and their associated invertebrates important as trout food items.

It is anticipated that the Low Fluctuating Flow Alternative would not adversely affect rainbow trout when compared to existing conditions (No Action), and would improve habitat conditions for spawning trout, and improve conditions for *Cladophora* and *Gammarus*.

Financial Exception Criteria Element.—Aquatic resources (and critical periods) identified during discussions of interim flows include trout (December through March), *Cladophora* (December through February and June through August), and native fish (May through October). Deviations of concern involved greater maximum flows and lower minimum flows and greater descending ramp rates.

There are concerns that use of financial exception criteria would cause stranding of spawning trout and dewatering of redds, allow *Cladophora* beds to be exposed to freezing and desiccating conditions, and strand native fishes in backwaters. However, because minimum flows of 5,000 and 8,000 cfs would be maintained (by bypassed flows if necessary), the financial exception criteria would not adversely affect these resources.

There is a valid concern for the flushing of native fish from backwaters by flows in excess of 20,000 cfs. However, it is assumed that time limitations on the use of financial exception criteria would limit any long-term adverse impacts to native fish to some level less than those of existing conditions (No Action).

THREATENED AND ENDANGERED SPECIES

Endangered species and Category 1 and 2 Candidates¹ considered in this report include the American peregrine falcon, bald eagle, southwestern willow flycatcher, humpback chub, razorback sucker, flannelmouth sucker, and *Flaveria mcdougalli*.

Peregrine Falcon

The American peregrine falcon was listed as endangered in 1970.

Affected Environment/No Action Alternative Consequences.—Grand Canyon National Park supports the largest breeding population of peregrine falcons in the contiguous United States, with the majority nesting along the river corridor (Carothers and Brown, 1991). Although still under investigation, it is assumed that the peregrine falcon's success in the canyon is linked to an abundant prey base: violet-green swallows, white-throated swifts, and several species of bats. The prey species are abundant because of insect populations produced in the clear river water. Clear water is a result of construction and operation of Glen Canyon Dam. Peregrines also take waterfowl that use pools between rapids during their migrations.

Low Fluctuating Flow Alternative Consequences.—The assumed absence of flood flows during the interim period would benefit riparian vegetation that is used by insects for food and cover. This, in turn, aids the growth of insect populations, which translates into benefits for swallows, swifts, bats, and, ultimately, peregrine falcons.

Reduced beach erosion under the Low Fluctuating Flow Alternative (as compared to the No Action condition) would also permit improved conditions for riparian vegetation. As discussed above, these conditions would benefit peregrine falcons.

Primary productivity within the river is controlled by many factors (Carothers and Brown, 1991), but the proposed action would affect only light transmittance through changes in water clarity. Mixing actions on pool and beach sediments from fluctuating flows and sediment augmentation from tributaries both affect river water clarity. The proposed action may affect sediment mixing through reduced fluctuations. If such effects occur, they should improve water clarity somewhat over No Action conditions. Improvements in water clarity should translate into benefits to peregrine falcon

¹ "Endangered species" is a species in danger of extinction throughout all or a significant portion of its range. "Category 1 Candidate" is a taxa (species or subspecies) for which there is substantial information to support the biological appropriateness of proposing to list as threatened or endangered. "Category 2 Candidate" is a taxa for which some information may indicate that listing is possibly appropriate, but biological data on vulnerability and threat are not currently available.

populations through the food chain linkages discussed above. However, because of the short-term duration of the proposed action (3 years), no measurable change in peregrine falcon population parameters, linked to the action, is expected.

Financial Exception Criteria Element.—It is assumed that current operations of Glen Canyon Dam have contributed to the success of peregrine falcons in the Grand Canyon. The use of financial exception criteria, which would emulate current high-flow operations, would cause no adverse affect on peregrine falcons when compared to No Action conditions.

Bald Eagle

The bald eagle was listed as endangered in 1967.

Affected Environment/No Action Alternative Consequences.—The Colorado River corridor of the Grand Canyon has become an important winter concentration area for bald eagles. While eagles are capable of taking fish from a river system with characteristics identical to the Colorado River before Glen Canyon Dam, they were not often observed in the Grand Canyon until after the trout fishery became established. Bald eagle use of the river corridor is concentrated around Nankoweap Creek where the birds exploit winter-spawning trout. Eagles first appeared in the winter of 1985-1986 (four birds) and have increased to a high of 26 birds counted in a single day at Nankoweap Creek in the winter of 1989-1990. Some 70-100 bald eagles moved through the area in February and March of 1990 (Brown and Leibfried, 1990).

Eagles do take trout stranded by fluctuating flows in isolated pools along the river near the creek mouth, but the focus of feeding activity is in Nankoweap Creek itself (Brown and Leibfried, 1990). There is a physical barrier at the mouth of Nankoweap Creek that prevents trout from ascending the creek when river flows are below approximately 4,000 cfs. At low (greater than 4,000 cfs) and moderate (less than 15,000 cfs) flows, the creek mouth and the lower 30 meters are used most frequently by foraging eagles. At these flows, trout are distributed over a shallow gravel area and are vulnerable to foraging eagles. When flows exceed approximately 15,000 to 20,000 cfs, these areas are inundated and eagles forage further up Nankoweap Creek. The energetic effects of such shifts are still under investigation.

Although research is still underway, it appears that the number of eagles at Nankoweap Creek may be related to the abundance of spawning trout. More than 500 trout have been recorded at Nankoweap Creek during recent years, with the spawning run peaking at 1,500 fish in 1990 (Brown and Leibfried, 1990). The number of trout attempting to ascend and spawn is a function of the number of spawning trout in the river and conditions in Nankoweap Creek. Eagle numbers at Nankoweap Creek were down in 1990-1991 as were the numbers of spawning trout. In 1990-1991, low flows in Nankoweap Creek, low water temperature, and ice may have limited the number of trout attempting to ascend and spawn in the creek.

Low Fluctuating Flow Alternative Consequences.—It is assumed that bald eagle use of the Grand Canyon is primarily linked to the presence of trout in the Colorado River, and specifically to the abundance of trout attempting to spawn in Nankoweap Creek.

Any factors that affect the numbers or availability of trout in Nankoweap Creek, and to a much lesser degree in the river corridor, would therefore likely affect bald eagles.

The proposed action would not affect flows, water temperature, or icing in Nankoweap Creek, but would affect the availability, as prey, of trout attempting to ascend the creek and spawn. Under the proposed action, restrictions on descending ramp rates and minimum flows would reduce the number of trout stranded along the river near the mouth of Nankoweap Creek. Preliminary data indicate that fish stranded at such sites by fluctuating flows contribute approximately 10 percent to the caloric intake of eagles at Nankoweap Creek (Brown and Leibfried, 1990). However, the reduced availability of stranded trout may be offset by higher minimum flows (5,000/8,000 cfs) permitting unrestricted trout access to Nankoweap Creek, where shallow water increases their vulnerability to eagle predation.

The impacts of the proposed action on trout in the river have been previously discussed. In general, benefits to trout should equate to benefits for foraging eagles.

In summary, the proposed action would result in both negative and positive impacts on the availability of trout as prey for wintering and migrating bald eagles using the Grand Canyon. Restrictions on minimum flows and descending ramp rates would reduce the number of trout stranded near Nankoweap Creek and elsewhere along the river corridor. These reductions in stranded prey may be offset by unrestricted physical access to Nankoweap Creek from the river afforded by minimum flows of 5,000/8,000 cfs. The proposed minimum flows would also benefit trout by protecting the redds of trout spawning in the river and improving habitat conditions for *Cladophora* and *Gammarus*. Overall, it is assumed that the proposed action would result in either no change to trout resources available to foraging bald eagles or a minimal increase in those resources. It should be noted, however, that the proposed action does not affect parameters of Nankoweap Creek that are important in determining its suitability as a spawning site for trout.

Financial Exception Criteria Element.—Because minimum flows would be maintained even if financial exception criteria are used, the status of spawning trout serving as potential food for bald eagles would not be adversely affected. Flows higher than 20,000 cfs would cause eagles to shift their foraging activity further up Nankoweap Creek. This situation would be temporary and would result in no adverse effects to bald eagles.

Southwestern Willow Flycatcher

The southwestern willow flycatcher is a Category 2 Candidate for listing.

Affected Environment/No Action Alternative Consequences.—Nesting pairs of southwestern willow flycatchers increased following closure of Glen Canyon Dam. Carothers and Brown (1991) attribute this response to increases in riparian vegetation following reductions in high flood flows.

This species nests in the NHWZ in tamarisk. Mean nest height is over 6 feet. Only two pairs were located in the Grand Canyon in 1991. Causes for changes in the numbers of nesting pairs is unknown.

Low Fluctuating Flow Alternative Consequences.—As previously stated, it is assumed that the absence of flood flows during the interim period would permit adjustments toward post-flood (1983) equilibrium in both habitat and wildlife populations, including the willow flycatcher.

Reduced beach erosion under the Low Fluctuating Flow Alternative would permit improved conditions for riparian vegetation and thus improve willow flycatcher habitat. However, because other factors outside the study area also affect willow flycatcher population, numbers of breeding pairs may not increase in the short term (3 years).

Financial Exception Criteria Element.—Southwestern willow flycatchers nest in the NHWZ. Nests should be well above any high flows resulting from the use of financial exception criteria.

Humpback Chub

The humpback chub is listed as endangered because its population is severely reduced to isolated remnants of its original range.

Affected Environment/No Action Alternative Consequences.—The Grand Canyon population of humpback chubs spawn in the Little Colorado River between March and June (U.S. Department of the Interior, 1988). Cold water releases from Glen Canyon Dam are believed to limit or prevent reproduction in the Colorado River. Larval and juvenile development occurs in the lower reaches of the Little Colorado and backwaters and low-velocity habitat of the mainstem Colorado River. Although they are rarely stranded by fluctuating flows, they are displaced from backwater habitats where they may be more susceptible to predation and excessive energy expenditures (U.S. Department of the Interior, 1988). The instability of backwaters as a result of flow fluctuations may limit food availability by disrupting zooplankton reproduction.

Low Fluctuating Flow Alternative Consequences.—The 3-year duration of the interim flows, moderation of the existing flow regime, and the long-lived character of humpback chubs (30 years) suggest that the interim flows would not have a long-term adverse impact on the species (U.S. Bureau of Reclamation, 1991). No change in water temperature in the main channel of the Colorado River would occur. Early life stages would be forced to less-than-optimal habitats as backwaters are dewatered and inundated as a result of the interim flow fluctuations; however, these adverse impacts would occur less frequently than under existing conditions. The proposed action would have no affect on humpback chub in the short-term.

Financial Exception Criteria Element.—Maintenance of minimum flows would not adversely affect juvenile humpback chubs in backwaters of the mainstem Colorado River.

Razorback Sucker

The razorback sucker was listed as endangered in October 1991.

Affected Environment/No Action Alternative Consequences.—The razorback sucker is an exceptionally long-lived fish, in excess of 50 years (Carothers and Brown, 1991). This species' range is severely reduced, and it fails to reproduce or rear young to maturity. No young and very few adults have been collected in the riverine reaches below Glen Canyon. The dearth of sightings suggests that the existing conditions in the canyon are not favorable, but the impact of the current flow regime is unknown.

Low Fluctuating Flow Alternative Consequences.—The razorback sucker, like the humpback chub, is a long-lived species. With no reproduction documented as existing in the Grand Canyon, effects would be limited to remaining adults. Razorback sucker longevity and the relatively short term of the interim flows would result in no adverse impacts. The proposed action would not affect the razorback sucker in the short term.

Financial Exception Criteria Element.—Financial exception criteria would not adversely affect the razorback sucker.

Flannelmouth Sucker

The flannelmouth sucker will soon be proposed as a Category 2 candidate for listing under the Endangered Species Act.

Affected Environment/No Action Alternative Consequences.—Flannelmouth suckers are distributed throughout the Colorado River in the Grand Canyon, but appear to segregate in different reaches depending on life stage. Maddux et al. (1987) found adult flannelmouth suckers most abundant in the reach between the dam and the Paria River, while juvenile and larval fish were sampled from lower reaches. Tributaries, such as Shinumo, Kanab, and Havasu Creeks, are important spawning areas (Carothers and Brown, 1991). The lower reaches of the river may serve as nursery and rearing areas with subsequent dispersal upstream (Maddux et al., 1987). Specifically, tributaries and backwaters between Bright Angel Creek and Diamond Creek may serve as important nursery areas.

Backwaters are important to fish habitat and exhibit seasonal use patterns that may be linked to changes in temperature and flow. Abundance of all species using backwaters declines as water temperatures decline to channel temperatures, and abundance of flannelmouth suckers declines in backwaters during fluctuating flows (Maddux et al., 1987). Backwaters were more abundant at lower flows (4,800 cfs) than at higher flows (28,000 cfs).

Low Fluctuating Flow Alternative Consequences.—Several studies concerning aspects of native fish biology are currently under way in the Grand Canyon, and the results of those studies should improve our understanding of the relationships between flannelmouth suckers and their habitat. For the purposes of this evaluation, it is assumed that conditions affecting backwaters also affect flannelmouth suckers. This is undoubtedly a gross simplification of the various parameters affecting flannelmouth suckers.

The effect of the Low Fluctuating Flow Alternative on flannelmouth suckers is assumed to be identical to that discussed for native fishes. The proposed action may result in some warming of backwaters due to reduced ramp rates, assure access to tributaries

and other spawning sites through increased minimum flows, and afford increased stability to backwaters through a narrower range in fluctuations when compared to the No Action Alternative. The potential impact of exotic fish on native fish populations resulting from reduced fluctuations is unknown, but is assumed to be nonexistent or minimally adverse in the short term. Overall, these changes are expected to create conditions that either do not adversely affect (no change) or are minimally beneficial to flannelmouth suckers when compared to the No Action conditions.

Financial Exception Criteria Element.—Financial exception criteria would not adversely affect the flannelmouth sucker.

Flaveria Mcdougalli

Flaveria mcdougalli is a Category 1 Candidate.

Affected Environment/No Action Alternative Consequences.—This plant is thought to be limited to the Grand Canyon in the Inner Gorge between Matkatamiba Rapids and Lava Falls. It is found in permanently moist seeps at elevations between approximately 1,640 and 1,970 feet.

Low Fluctuating Flow Alternative Consequences.—It is assumed that most *Flaveria* habitat is above the fluctuating zone; therefore, the absence of flood flows during the interim period would be beneficial to these populations. If populations exist in the upper fluctuating zone, constraints on maximum flows (20,000 cfs) in the proposed action would reduce risk from inundation and erosion. If populations of *Flaveria* occur below the 20,000-cfs flow stage, impacts from the proposed action would probably equal those occurring under No Action conditions.

Financial Exception Criteria Element.—Plants in the upper fluctuating zone could experience short-term and infrequent inundation as a result of this element; however, the adverse impacts associated with inundation would not be as severe as those under the No Action Alternative. The impact to the majority of the populations which occur above the fluctuating zone would be similar to those occurring under the No Action Alternative.

Arizona Species of Concern

Arizona lists three Species of Concern that may occasionally use the river corridor in the Grand Canyon: osprey, belted kingfisher, and river otter. The osprey is assumed to be a transient visitor to the canyon, and its ability to take fish from the river would not change between the No Action and Low Fluctuating Flow Alternatives. The belted kingfisher is also a transient visitor along the river. Changes between the two alternatives would not affect this species. The river otter has not been sighted in the Grand Canyon since 1983. If otters are present, lower fluctuations under the proposed action should improve habitat conditions for this species.

Financial exception criteria would not adversely affect these species.

CULTURAL RESOURCES

AFFECTED ENVIRONMENT/NO ACTION ALTERNATIVE CONSEQUENCES

Approximately 495 archeological sites have been recorded in the Grand Canyon. Under existing operating criteria, 44 are directly subject to flow-caused erosion of the sediment which has acted as foundation for these near-river sites. Long periods of flooding in 1983 and resumption of fluctuating flows uncovered many sites, making them more susceptible to erosion of support material. The No Action Alternative would be a continuation of this condition.

The Charles H. Spencer paddle wheel steamboat has been designated a National Historic Site (Carrel, 1987). Several feet of the upper hull are exposed at discharges of 5,000 cfs and are subjected to rapid wetting and drying from waves which increase the rate of decay of the wood; the discharges also intensify the hull's exposure to vandalism. At discharges of 20,000 cfs to 25,000 cfs, the hull is susceptible to scour by sand and drifting vegetation. Therefore, under the No Action Alternative—with low flows of 1,000 cfs in winter and 3,000 cfs in summer, along with high flows of 31,500 cfs—the steamboat is subjected to extreme adverse conditions daily.

LOW FLUCTUATING FLOW ALTERNATIVE CONSEQUENCES

The Low Fluctuating Flow Alternative would be less damaging overall. It would reduce the number of archeological sites directly subject to flow-caused erosion by approximately 6 to 8 sites.

Under the Low Fluctuating Flow Alternative the hull of the Charles H. Spencer steamboat would rarely be exposed and scouring would be almost nonexistent.

Chapter IV explains how compliance with Section 106 of the National Historic Preservation Act is being accomplished.

Financial Exception Criteria Element

With these criteria, there would be a greater risk of erosion of the foundation sediments of near-river archeological sites. However, the risk would be minimized because down-ramping and minimum flow criteria would be maintained by bypasses. This potential impact would be less than that with the No Action Alternative.

The Charles H. Spencer paddle wheel steamboat would be subjected to scouring if flows exceeded 20,000 cfs. Minimum flows would be maintained. Again, this impact would be less than that with the No Action Alternative.

RECREATIONAL RESOURCES

Within the study area, three groups account for almost all of the recreational use of the river: anglers, white-water boaters, and day-use rafters in the Glen Canyon reach. For purposes of analysis, anglers and day-use rafters have been combined since the major impacts occur in the Glen Canyon reach upstream of Lees Ferry.

ANGLERS AND DAY-USE RAFTERS

Affected Environment/No Action Alternative Consequences

Following completion of Glen Canyon Dam, the first 15 miles between the dam and Lees Ferry were stocked with trout and became a blue ribbon trout fishery. This section of the river is flat water and is fished predominantly from boats which are launched at Lees Ferry and from the banks near Lees Ferry.

Judging from the number of large fish (over 23 inches) caught, the fishery peaked in 1978. Due to increased fishing pressure and a changing fishery, the average weight of fish caught declined between 1978 and 1984 but has since increased somewhat. Usage peaked in 1983 at 52,000 angler-days.

From 1983 to 1985 use dropped steadily in response both to poorer fishing and to more restrictive fishing regulations implemented in 1978 and 1980 (Janisch, 1985). In 1985, the area recorded only 15,000 angler-days. Angler use has been on the increase since 1987, though, with 38,800 angler-use days reached for 1990.

Trout fishing does occur downstream in Grand Canyon, but it is a relatively minor activity at present in terms of user-days.

In 1985, 8,469 visitors took half-day commercial raft trips on the 15-mile flat-water section of the Colorado River between the dam and Lees Ferry. These flat water tours are extremely safe, with no reported accidents. On these short trips, river flows affect only the point of departure. At flow levels less than powerplant capacity, 20-person tours depart from a dock near the dam and float down to Lees Ferry. When releases are made above powerplant capacity, trips depart from Lees Ferry with 10 passengers and motor part way upstream before floating back downstream. At that point, trips become unprofitable for rafting companies due to increased fuel usage and are generally not offered.

At flows of 3,000 cfs or less, large boats cannot get past the sand and gravel bar 3 miles upstream from Lees Ferry; and even very small boats may have to be dragged over slippery rock gravel bars. Consequently, under these conditions, nearly all fishing occurs in the 3 miles just above Lees Ferry. However, low water tends to concentrate fish, and bank anglers can find large areas of exposed gravel and rocks, leaving a great deal of space between the water and the edge of the vegetation.

Fluctuating water levels add additional difficulties. Falling water may make it difficult for boats to return downstream over rocks and gravel bars that had more water over

them on the trip upriver. Rising water may increase the likelihood of swamping a boat while anchored or while the bow is pulled up on shore. A few anglers favor fluctuating flows, believing that rising water may stimulate feeding by fish.

Low Fluctuating Flow Alternative Consequences

The extent that flows affect the quality of downstream recreation those effects would be reflected in recreational values. Low fluctuating flow conditions would produce higher values than the No Action Alternative, assuming that National Park Service (NPS) policies for the Glen Canyon National Recreation Area and fishery management decisions of the Arizona Department of Game and Fish (ADGF) are not changed. Stable water levels would improve access to the Glen Canyon reach for angling and day-use rafters.

The higher water associated with No Action disperses the fish, which may reduce fishing success. It also creates stronger currents, increasing problems for boat handling. Thus, a steady, low fluctuating flow would provide a safe, consistent, and predictable recreation area for anglers, except when the infrequent emergency criteria would be used.

Financial Exception Criteria Element.—The quality of angler experiences in the Glen Canyon reach would be slightly reduced compared to conditions without financial exception criteria due to increased frequency of higher flows. Day-use rafting would also be slightly adversely impacted with periodic, yet unscheduled fluctuating flows. Although adverse impacts to safety would be minimal, safety would be less than that under conditions without financial exception criteria.

WHITE-WATER BOATERS

Affected Environment/No Action Alternative Consequences

The Grand Canyon white-water section of the Colorado River begins at Lees Ferry and continues for over 200 miles through Grand Canyon National Park. It is one of the premier white-water rafting areas in the world because of the numerous challenging rapids and the magnificent natural setting in one of the longest stretches of remote backcountry in the United States.

From 1960 to 1972, the number of boaters annually running the river grew from 205 persons to 16,432. In 1972 increasing problems with the management of human waste and trash along the river, damage to fragile soils and vegetation, and destruction of prehistoric sites prompted the NPS to establish a ceiling on the number of user-days allowed each year and to institute stricter river-use regulations to help minimize impacts by river runners.

For the past 10 years the NPS has limited total white-water user-days to 115,500 per year for passengers on trips provided by commercial outfitters and 54,450 user-days for private individuals. Partly as a result of the flow regulation of Glen Canyon Dam, this has grown into a \$14 million-a-year industry, according to NPS records.

Many types of boats are used: small 14- to 18-foot oar-powered rafts (roughly 45 percent), motorized 30-foot rafts (25 percent), kayaks (20 percent), and dories (6 percent). Motorized trips vary from a 3- to 4-day trip between Lees Ferry and Phantom Ranch (approximately 90 river miles), to a 7- to 10-day trip through the entire Grand Canyon to Lake Mead (approximately 250 river miles). Permits are issued for periods as long as 18 days.

White-water boaters camp each night on sand bars which provide relatively level campsites free of vegetation and rocks. Sand bars are also utilized for daytime stops when the riparian vegetation can provide shade.

Fluctuations are generally detrimental to white-water boating. Fluctuations impair the naturalness of the setting and make the management of white-water trips difficult.

There are indications that certain types of flow patterns in the long term may reduce the number of sandy beaches in the Grand Canyon (U.S. Department of the Interior, 1989). At present, the area between Hance Rapids and Havasu Falls has fewer beaches than other parts of the canyon. Trip leaders must plan schedules very closely and coordinate with other groups to ensure a good campsite in this area. As beaches disappear, this careful planning would have to be extended to other parts of the canyon. This might mean missing some attraction sites or camping near or sharing a beach with other parties, and possibly making some camps in areas without any sand.

With large daily fluctuations from 10,000 cfs to 31,500 cfs, around an average daily flow of 19,000 cfs, boatmen have to take care in selecting mooring and camping sites. Due to low morning water levels, moored boats may be stranded and gear may have to be carried (perhaps across rocky areas) to the boats. Boatmen may wait above certain rapids for the water level to rise or may have to hurry to get to a certain rapid before the water level falls. In addition, some rapids may be difficult due to exposed rocks at low water levels and other rapids might be quite large at high water levels; it is likely that passengers may have to walk around a few of the rapids. When the water is high or rising, however, the standing waves in some of the major rapids become larger, resulting in a bigger "roller coaster" ride.

Low Fluctuating Flow Alternative Consequences

A major concern of white-water boaters is the potential loss of beaches in the Grand Canyon due to the erosive effects of flood flows and the fact that the supply of beach sediment has been greatly reduced by the presence of Glen Canyon Dam. The Low Fluctuating Flow Alternative would reduce the rate of beach erosion and maintain or improve camping opportunities. Also, low fluctuating flows would improve the natural setting, including wildlife habitat and vegetation and such unique qualities as cultural values and historic values.

Higher minimum flows would permit easier trip scheduling through rapids and more time to stop and visit attractions, thus improving the quality of the trip. Equipment damage would be less if low flows are avoided, and passenger safety would be improved if flows above 20,000 cfs are avoided.

Financial Exception Criteria Element.—During brief periods of exception, there would be a small decrease in the quality of white-water rafting on the river downstream of Lees Ferry compared to a Low Fluctuating Flow Alternative without financial exception criteria. Longer periods of exception operation would likely result in impacts similar to those under the No Action Alternative.

HYDROPOWER RESOURCES

AFFECTED ENVIRONMENT/NO ACTION ALTERNATIVE CONSEQUENCES

Physical Resources

Capacity/Energy.—Glen Canyon Powerplant has eight generating units with a maximum capacity totaling 1,356 kilowatts (kW)—four have capacity up to 165 megawatts (MW) each and four have capacity up to 173 MW each.

Power is generated by releases from Glen Canyon Dam on a fluctuating (peaking power) basis to conserve fuel resources, reduce air emissions, and increase the value of Glen Canyon Powerplant electricity produced by generating during high-use daytime periods. Fluctuating releases also are suited to hydropower, which is more flexible than other forms of electrical generation. In addition, when possible, higher releases to generate more electricity are scheduled in demand-intensive core winter and summer months.

Presently the marketing plan for the hydropower resource at Glen Canyon Dam consists of 1,270 MW of capacity and 3,028,882 megawatt hours (MWh) of energy in summer, and 1,291 MW of capacity and 2,672,826 MWh of energy in winter.² Approximately 12 percent of the energy and capacity is delivered to Western's Upper Colorado Load Control Area³ customers, and the remainder is exported to six adjoining areas for SLCA/IP's⁴ customers. More than half the consumers are rural electric associations and small municipalities.

Area Served.—Power produced at Glen Canyon Powerplant is marketed both in the immediate area indicated on the location map (figure 3) and in a wider area that is an integral part of the electrical power system of the Western United States, including the states of Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming. Part of this area is served by the Colorado River Storage Project (CRSP) transmission system operated by Western's Salt Lake City Area Office which also administers Western's Upper Colorado Load Control Area.

² Under a court-approved interim marketing plan, Western has contractual commitments for these energy and capacity amounts from SLCA/IP (National Wildlife Federation v. Western Area Power Administration, November 1989).

³ A load control area is a part of a power system, or a combination of systems, to which a common generation control scheme is applied.

⁴ For administrative and rate-making purposes, the Salt Lake City Area combined the Colorado River Storage Project, the Collbran Project, and the Rio Grande Project into the Salt Lake City Integrated Projects. The Provo River Project is also marketed with the SLCA/IP.

Transmission.—Within the Upper Colorado Load Control Area, Reclamation operates the Federal hydroelectric generating units and Western operates the Federal transmission system that primarily consists of the CRSP transmission system. The CRSP transmission system includes about 1,800 miles of high-voltage line from southern Wyoming through western Colorado and eastern Utah and into parts of New Mexico and Arizona. Because of benefits from interconnection, the Western United States and parts of Canada are electrically connected and operated under coordinated guidelines.

Scheduling and Regulation.—Scheduling is conducted in the load control area to help ensure that utility generation and load control area exports and imports are adequate for electrical demands. However, electrical demand is dynamic, and regulation is necessary to sense variations in demand and other changing conditions and to adjust generation levels to match these changes. Emergency conditions can also affect scheduling and regulation. As a safeguard in the event of an emergency and to provide regulation, unloaded or reserve generating capacity is maintained.

Marketing.—Western markets power and transmission services: the sale of long- and short-term firm power, nonfirm power, and transmission service (wheeling).⁵

Long-term commitments include energy/capacity amounts and are generally contracts for 10 years or more. They are based on estimates of the long-term availability of power. Long-term sales require Western to balance its CRSP Act mandate to market the greatest practicable amount of power that can be sold at firm power rates with the risk of having less water than forecasted to produce power. Effective October 1, 1990, the SLCA/IP combined power rate became 14.5 mills per kWh at a load factor⁶ of 58.2 percent in addition to a transmission charge.

Western offers short-term firm power sales, which are for a season or on a month-by-month basis when power available exceeds the demand. Nonfirm energy sales typically are for durations ranging from a month to several hours and follow market prices for various energy sources. Western offers firm transmission service, reserved capacity over the CRSP system, and nonfirm transmission service which, like nonfirm power sales, is interruptible on short notice.

Evaluation Factors

Both economic and financial analyses are components of Federal water resource management decisions. For both types of analyses the accounting standpoint is the nation as a whole, and the magnitude of the project or action's impact on regions, entities, and subpopulations is explicitly identified and quantified wherever possible.

An economic analysis focuses on the net benefits which will accrue to citizens of the United States regardless of where they accrue. Net benefits represent the difference

⁵ "Wheeling" is a transmission service required when one utility agrees to purchase or sell power to a second utility, and the two utilities are not directly interconnected but must make arrangements to use a third party's transmission system.

⁶ Load factor is the ratio of the average load during a designated period to the peak or maximum load occurring in that period.

between the change in total benefits less changes in expenditures. Often in an economic analysis, changes in expenditures are not important on a national basis because increased expenditures in one area are offset by decreased expenditures in other areas.

Financial analysis, on the other hand, recognizes that changes in expenditures may have important impacts in areas in which expenditure changes. Thus, a financial analysis focuses on understanding changes in flows of expenditures and resulting income, employment, and tax impacts.

LOW FLUCTUATING FLOW ALTERNATIVE CONSEQUENCES

Economic Impacts

From a national economic perspective, the economic impacts of the Low Fluctuating Flow Alternative are measured by the difference in production cost to the overall Pacific Southwest region electric power system compared to the No Action Alternative. Such studies are done using production expansion models which develop the lowest production costs given a range of possible power resources. Studies are currently under way to address this issue for the GCDEIS as part of the GCES II Research Program. Conclusive data are not yet available; however, in the short term covering the 3-year period of the interim flows, it appears that some excess capacity exists in the system. This capacity, which is likely found in thermal generating plants, could be used. There would be increased fuel and operating costs. Glen Canyon Powerplant would shift to a more baseload operation and would substitute for some existing thermal plants. There may be additional costs of using surplus thermal capacity for peaking if the equipment is not designed as a peaking facility. However, in the short run, the net effect on the cost of power from the overall system is estimated to be a relatively minor increase.

Financial Exception Criteria Element.—There would be no significant difference in the economic cost of generating power in the regional electric power system compared to a plan without financial exception criteria.

Financial (Marketing) Impacts

Without Financial Exception Criteria.—The consequences of the Low Fluctuating Flow Alternative without financial exception criteria in the near future would involve impacts to Western and to Western's customers in terms of service and the cost of replacement power as a result of interim operating criteria.

Under the interim operating criteria, Western could not meet its firm load obligation with Federal hydropower, and projects a change in the timing, magnitude, and expense of estimated purchases required to satisfy those firm contractual commitments. A shift in generation from on-peak to off-peak periods in most months would be anticipated. Assuming a fixed monthly amount of water, the change corresponds to off-peak water releases displacing water from on-peak to off-peak periods, leaving less water available on a daily basis for on-peak electric load generation. This, in turn, would require more

on-peak purchases. Western's estimate of cost to purchase replacement energy and capacity is \$22 million per year. These added costs to the Federal Government would have to be covered by increased costs to Western's customers.

In an 8.23-maf year, Glen Canyon would generate about \$55 million in revenue at current rates. The interim criteria would cause Western to purchase additional replacement power which, without financial exception criteria, is estimated to cost an additional \$22 million.

The \$22 million in added costs would be blended with the existing rate structure to Western's customers for an estimated 22-percent power rate increase. The customers would, in turn, blend the rate increase with their other sources of power and energy. Detailed data on the effect on Western's customers are not available.

The financial impact on the final consumer depends to a large extent on what portion of the customer's need is met by Western. This degree of dependence on CRSP power ranges from less than 5 percent to over 70 percent. The great majority of customers rely on Western to meet 35-50 percent of their demand. The financial impact to the consumer also depends on what prices the customer pays for its other sources of power. Generally, those consumers who own generation have lower costs than those who purchase from other suppliers. It is impossible to aggregate all these variable impacts and arrive at a single estimate of impact across the system.

A sample of customers shows the following increases in costs to power consumers:

Bountiful, Utah	+ 14.7 percent
Morgan, Utah	+ 13.8 percent
Dixie-Escalante, Utah	+ 11.4 percent
Ephraim, Utah	+ 10.0 percent
Platte River Power Authority, Colorado	+ 5.9 percent

These are typical of the majority of the CRSP customers, most of whom are in rural areas.

Nonfirm sales could be adversely affected by a shift of releases from on-peak to off-peak periods. Additionally, ramping rates and the maximum daily change would restrict Western's ability to respond to power system demands.

Financial Exception Criteria Element.—Financial exception criteria would permit temporary deviations from the interim operating criteria (not to exceed 3 percent of the time) to permit Western to demonstrate the availability of Glen Canyon generating capacity for meeting pooled utility obligations. Under this procedure, capacity at Glen Canyon Powerplant idled as a result of interim operating criteria would be available to Western up to 22 hours monthly so as to establish the availability of that capacity for meeting firm load requirements. It is intended that financial exception criteria will reduce the probability of having to purchase firm capacity. Savings to Western may be as much as \$19 million as compared to a plan without financial exception criteria.

INDIAN TRUST ASSETS

Indian trust assets include all legal interests in property on the reservation which the Federal Government holds in trust, including lands, minerals, and water. The Secretary of the Interior has the duty to administer Indian trust assets for the benefit of the Indian owners of those assets. Reclamation recognizes its responsibility to safeguard those assets affected by its programs or activities.

Implementation of interim operating criteria would be a reasonable action to protect Indian property interests in Glen and Grand Canyons from loss or damage until a long-term change in Glen Canyon Dam operations is implemented following completion of the GCDEIS and record of decision. The impacts to Indian trust assets would be identical to those presented under each environmental parameter analyzed in this chapter and summarized in table 3. This would include decreased rates of beach erosion and increased rates of sand accumulation in main channel pools and eddies; no change in areal vegetation coverage and wildlife habitat in the Old High Water Zone, a moderate decrease in the New High Water Zone, and a moderate increase in the fluctuating zone; moderate increases in native fishes and trout; a minimal increase in threatened and endangered birds and no change to threatened and endangered fish; decreased cultural resource site erosion and elimination of exposure and scouring of historic boat remains; improved fishing and rafting; improved wilderness values; and decreased on-peak power generation with minor system-wide increased power production costs, reduced ability to respond to power system demands, and increased energy purchase costs.

Four Indian tribes are among the Cooperating Agencies involved in the preparation of the GCDEIS. They were involved in the development of interim flow alternatives and review of this EA. Comments received are included in Attachment E.

CUMULATIVE IMPACTS

Due to the short-term nature of the proposed action, and the fact that any actions outside those described in the proposed action are unlikely, any cumulative impacts are expected to be minimal and of short duration.

PRELIMINARY FINDINGS OF TEST FLOW IMPACTS

FINDINGS BY RESOURCE CATEGORY

Testing of proposed interim operating criteria was instituted on August 1, 1991. It is the objective of this discussion to *qualitatively* address the effects of this test on the natural and recreation resources in the Grand Canyon. Only a qualitative, not quantitative, assessment is possible due to the very limited time for ecosystem response and limited GCES scientific effort that has gone into determining the impacts of the test. Ecosystem responses and biological processes take longer to manifest themselves than a month.

The effects of the test flows are outlined by category.

Sediment

The proposed interim operating criteria were designed to modify two critical parameters of operation that have detrimental impact to the sediment resources in the Grand Canyon—the ramping rate and the total change in flow level over a daily period. The intent was to limit the fluctuations both in terms of change per day and rate of change.

The effects seen to date are as follows:

1. A reduction in the overall erosion rates at the beaches in the Grand Canyon. This reduction has been manifested in a reduced amount of rill erosion, reduced bank seepage, and reduced slumping of the sediment resources. There has been a reduction, but not a total cessation, of the erosion process.
2. The sediment erosion processes are still ongoing in the Grand Canyon and will continue as a result of the limited sediment supply, the changing flow levels, and variable ramping rates. Bank failures and bank slumping are still occurring in the Grand Canyon related to the drying out of beach sediments and perhaps enhanced by the formation of steep slopes with little main channel support. It is possible that such ancillary activities as side channel debris flows or rainstorm activity may be acting with the flow regime in a cumulative effect on the sediment resources.
3. To date, the marshes that have started to re-establish themselves in the Grand Canyon have not shown a definitive response. Time and flow levels will dictate how the marshes respond.

Endangered Species

There has not been enough time to determine any specific ecological impacts on any of the endangered or special status species.

Trout

There has not been enough time to document the specific effects of the test on the trout that live in the Colorado River. The effects will fall into the three broad categories of biological processes, food resources, and physical habitat.

Biological Processes.—Trout growth has not shown any change.

Food Resources.—The food base in the area above Lees Ferry has shown some initial signs of recovery under the test. Specifically, the diatoms have begun to recolonize the rocks at the 5,000-cfs level and are building up in layers. There has not been enough time to document any specific changes in the *Cladophora glomerata* or the *Gammarus lacustris* populations.

Physical Habitat.—A limited amount of information has been collected to document the impacts of the test on the physical habitat utilized by the trout species. The majority

of the habitat issues will be focused on the winter spawning period. To date, with a reduction in fluctuations, the physical habitat has been increased for the juvenile and adult trout. Limited areas still exist for naturally reproduced fish.

Cultural Resources

A limited amount of information has been collected on the effects of the test on cultural resources. Specific areas of concern are the cultural sites contained within the sediment resources in the canyon and the exposure of the Spencer paddle wheel steamboat above Lees Ferry.

The sediment resources in the Grand Canyon have begun to stabilize in the canyon. Sediment erosion has been reduced; and, therefore, the loss of cultural resources has been reduced. During the first month of the test the minimum flows were above 8,000 cfs; and, therefore, the Spencer steamboat was covered by water and exposure was minimal.

Recreation

The effects of the test on recreation in the Grand Canyon have been positive to date. Reduced fluctuations and higher minimum flows have allowed for a safer passage of river trips through the Grand Canyon.

Power Resources

During the 90-day interim "test" release period, Western has been able to satisfy its long-term firm electric service contract commitments. Considerable purchases from other interconnected utilities have been required throughout each month, with increased purchases required during the peak load periods both on weekdays and weekends. These purchases have been limited to interruptible (or "nonfirm"), energy-only purchases, rather than noninterruptible (or "firm"), energy-with-capacity purchases. The average price for these nonfirm, energy-only purchases (21 mills/kWh, onpeak; 15 mills/kWh, off-peak) have been higher than recent historic nonfirm energy purchases in these months, but lower than the price for potential firm energy-with-capacity purchases (45 mills/kWh). However, the assumption of continued availability, access, and pricing for nonfirm energy-only purchases is not believed to reflect future long-term conditions. Concern also exists as to whether Western can legitimately continue to claim the full unrestricted capacity at Glen Canyon to meet contractual firm load commitments. Western continues to assert that eventually it must demonstrate to interconnected utilities that, to meet peak and hourly changes in firm load, either (a) the full installed capacity at Glen Canyon is operable and available; or (b) a significant portion of Glen Canyon installed capacity is declared as constrained (or "inoperable") due to release restrictions, and steps must be taken to acquire adequate long-term replacement firm power.

CHAPTER IV

CONSULTATION AND COORDINATION

SUMMARY

The process to develop interim operating criteria was begun in February 1991 and has involved numerous government agencies (both State and Federal), Native American tribes, and private organizations. These participants are identified in the distribution list at the end of this chapter.

The process of developing and implementing interim operating criteria was presented to the Cooperating Agencies for the GCDEIS on February 28, 1991. It was further discussed at Cooperating Agencies meetings April 3 and 4, June 13 and 14, July 1 and 2, and September 16, 17, and 18. It was also presented at interested parties meetings April 3, June 13, July 1, and September 17. During these meetings, participants were given the opportunity to present data and voice opinions about interim flows. These meetings—along with this document's distribution for review and comment—constitute appropriate public involvement.

The Colorado River Basin States have been kept apprised of the progress pertaining to the interim operating criteria. They were sent all information on the Cooperating Agency meetings and were invited to participate in the interested party meetings described above.

In addition, representatives of the Basin States were briefed on the interim operating criteria at an informal meeting in Denver, Colorado, on October 7, 1991.

Formal consultation with the Basin States was accomplished at a meeting in Las Vegas, Nevada, on October 28, 1991. At this meeting, the Basin States' representatives expressed concern about water release procedures during years in which the annual release volume from Glen Canyon would exceed 8.23 maf. If such a year occurs, the specific releases would be re-evaluated in consultation with the Cooperating Agencies and the Basin States before a decision is made.

It was decided that the Basin States would receive copies of the monitoring reports, and that the interim operating criteria would be an agenda item in future meetings among Reclamation and the Basin States.

The Basin States representatives did not object to the interim operating criteria as described in the EA.

FISH AND WILDLIFE COORDINATION

Consultation with the U.S. Fish and Wildlife Service (FWS) and the ADGF was conducted throughout the process, and they were included in the formulation of the

proposed interim operating criteria. This consultation resulted in two memoranda (Attachments B and C) indicating compliance with the Endangered Species Act and the Fish and Wildlife Coordination Act (FWCA).

The FWCA Draft Planning Aid Report contains the following recommendations and conclusions:

RECOMMENDATIONS AND CONCLUSIONS

It appears that the Proposed Action will accomplish its objectives to decrease the effects of river operations on the terrestrial and aquatic ecosystems of Glen and Grand Canyons.

There are several conditions related to financial exception criteria that need to be resolved. As indicated earlier, the FWS questions the appropriateness of financial exception criteria at this time. In most cases, the exceptions exercised should be transitory events that would have little effect upon the expected benefits of the Proposed Action. However, as those events become chronic (either through frequent repetition or extended duration) or acute, their importance would be elevated. As a result, we suggest the following:

(1) The FWS supports exceptions for system emergencies and system regulation only. The FWS does not support financial exception criteria at this time. We do not believe financial exceptions would be in consonance with the intent of the interim flow legislation ". . .to protect, mitigate adverse impacts to, and improve the condition of, the environmental, cultural, and recreational resources of Grand Canyon National Park and Glen Canyon National Recreation Area downstream of Glen Canyon Dam. . ." (U.S. H.R. 814, 1991).

(2) The effects of all exceptions should be closely documented for both environmental and financial costs where possible. Monitoring over the life of this 3 year project should be keyed to specific measurable indicators. The results of monitoring should be used to amend exception criteria and adapt operations, where appropriate.

(3) Recovery from exception conditions should be ameliorated to the extent practicable. While the trigger for an exception event may be sudden and unplanned for, recovery should take place along pre-planned guidelines with an emphasis on ramping rates and daily fluctuation limits.

(4) Bypass should be evaluated as a mechanism to ameliorate any rapid down ramp employed during exceptions when practicable, and bypass and spinning should be incorporated in all exceptions to maintain minimum flows.

As shown in chapter II, the conditions placed on the financial exception criteria and which would, in fact, be in effect for the system emergency and system regulation exceptions, would minimize any adverse effects of these exceptions to the Low Fluctuating Flow Alternative. Recommendations 2, 3, and 4 are essentially included in the exception criteria conditions.

Reclamation believes that with these conditions the financial exception criteria would be in consonance with the intent of the draft legislation (U.S. H.R. 814, 1991) cited in the first recommendations of FWS.

CULTURAL RESOURCES

The National Park Service and Reclamation, in consultation with the Arizona State Historic Preservation Officer and the Advisory Council on Historic Preservation, is in the process of determining the eligibility of the 495 archeological sites for listing on the National Register of Historic Places. This consultation will lead to a Memorandum of Agreement and a proposed treatment of the sites to mitigate impacts, and is part of the overall effort for the GCDEIS. This will constitute compliance with Section 106 of the National Historic Preservation Act.

Reclamation recognizes that implementing the interim operating criteria would affect the Charles H. Spencer paddle wheel steamboat. Reclamation and the NPS are in the process of complying with Section 106 on this property in consultation with the Arizona State Historic Preservation Officer and the Advisory Council.

Native American groups (see distribution list) were afforded the opportunity to identify potential impacts of interim operating criteria on traditional cultural areas or sacred places in the Grand Canyon during Cooperating Agency meetings and review of the draft environmental assessment.

The Hopi Tribe has provided Reclamation with a short paper entitled The Role and Importance of the Grand Canyon in Hopi Culture and Society. This may be found in the Hopi Tribe's Letter of Comment (No. 11a).

EXECUTIVE ORDERS

Executive Order 11988 requires Federal agency avoidance of long- and short-term adverse impacts to flood plains; and Executive Order 11990 requires minimization of the destruction, loss or degradation of wetlands, and preservation and enhancement of the natural and beneficial values of wetlands. The interim operating criteria would provide short-term protection to the Colorado River flood plain and associated wetlands below the dam, as described in the sediment and vegetation sections of chapter III, until implementation of final operating criteria for Glen Canyon Dam. The public review required by both executive orders has been achieved through the public scoping and Cooperating Agency meetings for the GCDEIS.

DISTRIBUTION LIST

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Arizona Wildlife Federation

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Anita Rochelle
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Spreck Rosecrans
Environmental Defense Fund

Jack Ross
Upper Colorado River Commission

Jame Ruch
Grand Canyon Trust

Duane Shroufe
Arizona Game and Fish Department

Rob Smith
Sierra Club Southwest Office

Joshua Sondheimer
Natural Resource Defense
Council Inc.

Sam Spiller
U.S. Fish and Wildlife Service

Gaylord Stavely
Canyoneers, Inc.

Jack Stonehocker
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of Nevada

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Larry Thomas
Canyonlands National Park

Tom Trent
Arizona Department of
Environmental Quality

Chris Turk
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Bob Witzeman
Audubon Society

Kevin Wolfe
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Chuck Wood
National Park Service

James Young
U.S. Fish and Wildlife Service

Gerald Zimmerman
Colorado River Board of California

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ATTACHMENT A
ENVIRONMENTAL COMMITMENTS

ATTACHMENT A

ENVIRONMENTAL COMMITMENTS

The following commitments would be carried out if the proposed action is implemented.

1. An environmental monitoring program, including periodic reports, would be carried out for the duration of the interim flows to include evaluation of the following:

- Evaluation of the flow characteristics of the interim releases;
- Evaluation of the impacts of the exception criteria on the flows and on the resources; and
- Evaluation of the resource responses to interim flow and the impacts to the following resource components:
 1. Sediment deposits/change
 2. Sediment transport rates
 3. Archeological impacts by site and by area
 4. Trout stranding and population dynamics
 5. Aquatic food base changes
 6. Native fish - habitat and population dynamics
 7. Vegetation and marshes changes
 8. Recreation and accident rates
 9. Terrestrial habitats change
 10. Water quality response
 11. Economic (financial) consequences.

2. All required permits would be obtained.

ATTACHMENT B
ENDANGERED SPECIES ACT MEMORANDUM



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019

September 17, 1991

Memorandum

To: Regional Director, Bureau of Reclamation, Salt Lake City, UT

From: Acting Field Supervisor

Subject: Endangered Species Considerations of Interim Flow Proposal

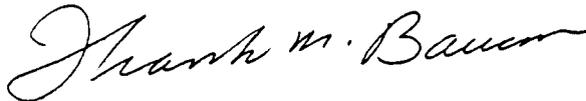
This is in response to a September 9, 1991, telephone request from Gordon Lind of your staff for Fish and Wildlife Service (FWS) guidance on procedures for endangered species compliance on the interim flow proposal for Glen Canyon Dam.

The Secretary of the Interior directed on July 27, 1989, that an environmental impact statement (EIS) be prepared on the operation of Glen Canyon Dam. The Bureau of Reclamation (Reclamation) is lead, and the FWS is one of the nine other Cooperating Agencies in the preparation of the EIS. With announcement of the EIS for Glen Canyon Dam, FWS Regional Director Spear advised Reclamation that preparation of the biological opinion on the operation of Glen Canyon Dam should be based on the preferred alternative for the EIS. The writing of the EIS has begun, and Reclamation is continuing consultation under Section 7 of the Endangered Species Act.

Pending legislation and concerns regarding impacts of continuing the existing operation of Glen Canyon Dam on downstream resources led to the development of proposed interim criteria for operation of the dam. These criteria will remain in effect until the final decision on dam operations, based on the findings of the EIS, are implemented. The interim flow recommendations were developed within the framework of existing operations to reduce detrimental impacts to downstream resources, particularly sediment. The Cooperating Agencies and the Senior Scientist for the Glen Canyon Environmental Studies have contributed to the recommendations.

At your request, we recommend the following for your consideration in preparation of the environmental assessment on interim operations. We believe that a separate biological opinion will not be necessary since Section 7 consultation is continuing on the action Reclamation and the Cooperating Agencies will be proposing in the EIS. Proposed interim operations have been designed to assist in reducing adverse impacts to downstream natural resources and to endangered, threatened, or proposed endangered species, while keeping this action within the existing operation of Glen Canyon Dam.

If we can be of further assistance, please contact Frank Baucom, Debra Bills, or Sam F. Spiller, Field Supervisor (602/379-4720 or FTS 261-4720).



Frank M. Baucom

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (FWE/SE/HC)
Regional Director, Fish and Wildlife Service, Denver, CO
Superintendent, Grand Canyon National Park, Grand Canyon, AZ
Superintendent, Glen Canyon National Recreation Area, Page, AZ
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Area Manager, Western Area Power Administration, Salt Lake City, UT
Regional Administrator, Environmental Protection Agency, San Francisco, CA
Area Director, Phoenix Area Office, Bureau of Indian Affairs, Phoenix, AZ
Chairman, Havasupai Tribe, Supai, AZ
Chairman, Hopi Tribe, Kykotsmovi, AZ
Chairman, Hualapai Tribe, Peach Springs, AZ
Chairman, Navajo Nation, Window Rock, AZ
Field Solicitor, Field Solicitor's Office, Phoenix, AZ
Project Leader, Fish and Wildlife Service, Pinetop, AZ
Unit Leader, Cooperative Fish and Wildlife Research Unit,
Tucson, AZ

ATTACHMENT C

FISH AND WILDLIFE COORDINATION ACT MEMORANDUM



**UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
3616 W. Thomas, Suite 6
Phoenix, Arizona 85019**

October 30, 1991

MEMORANDUM

TO: Regional Director, Bureau of Reclamation, Salt Lake City, Utah
(Attn: UC-1500)

FROM: Field Supervisor

SUBJECT: Environmental Assessment on Interim Flows Criteria for Glen Canyon Dam Operations - Planning Aid Report

INTRODUCTION

This planning aid report is intended to advise the Bureau of Reclamation (Reclamation) of potential resource concerns and study needs for fish and wildlife resources in Glen and Grand Canyons including threatened and endangered species in the Colorado River affected by Interim Flows for Glen Canyon Dam. A draft planning aid report on the subject project was submitted to Reclamation on September 25, 1991. This document is prepared under authority of the Fish and Wildlife Coordination Act (FWCA) but does not fulfill the requirements of the final report pursuant to Section 2(b) of the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). A draft and final FWCA 2(b) report will be submitted to Reclamation corresponding to the Glen Canyon Dam Operations Environmental Impact Statement (EIS) schedule. This report was coordinated with the Arizona Game and Fish Department (AGFD), and their letters of comment are attached. The AGFD concurs with the content of this report; however, they do not support the Fish and Wildlife Service (FWS) opposition to the 3 percent (%) exception criteria for financial purposes.

FUTURE WITHOUT THE PROJECT - THE NO ACTION ALTERNATIVE

Conditions without the project under the No Action Alternative would consist of historic operations of Glen Canyon Dam prior to the implementation of Research Flows in June of 1990. The only restrictions would be minimum flows of 1,000 cubic feet per second (cfs) from Labor Day to Easter and 3,000 cfs minimum from Easter to Labor Day and maximum flows of 31,500 cfs. Flood flows are currently estimated at 1 in 20 years (USDI, Reclamation 1992).

SPECIAL STATUS SPECIES

Of critical importance is the potential effect of current operations on Federal listed or candidate species, pursuant to the Endangered Species Act (ESA). A jeopardy opinion is currently in effect for humpback chub with respect to operations of Glen Canyon Dam. Consultation is continuing for a Biological Opinion necessary for the Glen Canyon Dam Operations EIS.

This following review is important because the FWS indicated to Reclamation in a September 17, 1991 letter that "a separate biological opinion will not be necessary since consultation is continuing on the action that Reclamation and the Cooperating Agencies will be proposing in the EIS."

Humpback chub

The humpback chub (*Gila cypha*), a Federal listed endangered species, utilizes mainstem habitats in the Colorado River through Grand Canyon. The center of their distribution appears to be in the vicinity of the Little Colorado River (LCR) (Maddux et al. 1987). In recent years, humpback chub have been absent from the tailwater area below Glen Canyon Dam and rare below National Canyon. Adult fish appear to utilize eddy habitats in the mainstem in Grand Canyon (Maddux et al. 1987). Suitability analyses from the upper Colorado River suggest that adults actually utilize a wide range of depths but prefer depths greater than 7 feet with relatively slow water velocities (Valdez et al. 1990). The LCR appears to be the primary site of chub reproduction and recruitment for the Grand Canyon population (Minckley 1987). Temperatures in the main channel would be lethal to chub ova (Hamman 1982). Backwater areas downstream from the LCR are important nursery areas for young of year and subadult chub.

Under No Action humpback chub spawning and recruitment area would continue to be restricted to the LCR. Backwater areas downstream of the LCR would continue to be important nursery areas for young of year and juvenile fish.

Razorback Sucker

On October 23, 1991, the razorback sucker (*Xyrauchen texanus*) was listed under the ESA as endangered throughout its range. Finalization of this ruling will be effective in 30 days. Once thought extirpated from Grand Canyon, the razorback has been captured on several occasions in recent years. Little is known of the reasons for the decline of razorback sucker. Construction of large reservoirs that eliminated much of its original physical habitat and introduction of nonnative species that compete with or prey upon larval razorbacks are probable factors. Carothers and Minckley (1981) and Hendrickson (pers. comm.) have suggested the use of both mainstem and tributary habitats in Glen and Grand Canyons by adult razorbacks. Carothers and Minckley (1981) noted springtime movement into the Paria River.

The remaining populations of razorback in the lower basin of the Colorado River, appear to be limited to old, adult fishes. No reproduction has been documented from these fishes, although they have received little attention. If this is the case, it is questionable whether or not the remaining resident razorback sucker population could maintain itself under this alternative. The potential for recruitment of young to the population is unknown but appears highly unlikely.

Bald Eagle

The use of the mainstem of the Colorado River as a winter foraging area by bald eagle (*Haliaeetus leucocephalus*) is a relative recently observed development. This development appears to be related to a large congregation of rainbow trout at Nankoweap Creek during winter spawning. This trout spawn provides an opportunistic prey source for winter migrating birds. Preliminary studies in 1990 estimated use of the trout prey resource in or near the mouth of Nankoweap Creek at 70 to 100 different eagles during February and March of 1990 (Brown and Leibfried 1990). Estimates for bald eagles in the Nankoweap area were approximately one-fourth the 1990 figures (Bryan Brown, pers. comm.); however, this may have been offset by a broader use of the river corridor.

Effects of No Action on trout availability to bald eagles at Nankoweap Creek is unknown. However, trout are expected to continue to use this area for spawning as bald eagles will probably utilize the trout resource.

Peregrine Falcon

Peregrine falcon (Falcon peregrinis anatum), an ESA listed endangered species, utilizes cliffs for nesting sites. Surveys suggest that the Grand Canyon population of peregrine may be among the largest in the contiguous United States. This predatory bird is dependent upon smaller birds, bats, and potentially waterfowl as its prey base. Under the No Action Alternative, some continued declines may occur in beach and bar deposits due to continued erosional forces upon those deposits (Avery et al. 1990). As the areal extent and stability of deposits declines, the suitability for riparian habitat likewise declines. Although unknown, long-term or permanent changes in the extent and productivity of riparian areas could indirectly influence peregrine falcon.

FISHERIES RESOURCES

Rainbow Trout

A trout fishery was developed below Glen Canyon Dam as a recreational resource in the 15-mile tailwater area above Lee's Ferry. The thermal modification of waters released below the dam and associated management by the AGFD has made the area conducive to trout growth. The trout fishery, dominated by rainbow trout, extends into Grand Canyon where mainstem populations of tributary spawns have established themselves.

Under No Action, the trout population should be reminiscent of the successful fishery in the latter portion of the 1980's.

Spawning, Stranding, and Recruitment

Temperatures in the tailwater area below Glen Canyon Dam are near optimal for spawning rainbow trout (10 - 15° C) (Scott and Crossman 1973). Daily fluctuation in water surface elevation has been a subject of concern with respect to the spawning success and the survival of the spawners. During a three-day low flow experiment of 5,000 cfs (steady flows not fluctuating) in 1984, Maddux et al. (1987) identified approximately 800 stranded trout. Mortalities associated with isolated pools related to oxygen depletion, thermal stress, increased predation, and desiccation when fish are exposed directly to the atmosphere.

Adults appear to be most susceptible during the December through March winter months while spawning. Persons et al. (1985) suggested the fluctuating flows which effect adult trout would likewise compromise rainbow trout fry. Exposure of trout redds in the tailwater for periods of 10 hours or more would cause near total mortality of eggs in an exposed redd (Maddux et al. 1987).

The No Action Alternative would continue to subject adult trout to stranding, post-emergence fry to stranding, desiccation, or entrainment in high velocity flow, and trout eggs to potential desiccation. The additional ramification of adult mortality is that the reproductive potential of the population could be reduced. Mortality to eggs and larval trout would further reduce recruitment.

Food Resources and Growth

Trout tend to be opportunistic feeders and often display distinct trophic shifts in foods. In the project area trout fry appear to be dependent upon zooplankton. Adults utilized chironomid midge larvae, Cladophora, Gammarus, and detrital material (fish material appeared in a very small proportion of stomach samples less than 1%) (Maddux et al. 1987). The contribution of Cladophora to the diet of adult rainbow trout generally declined from upstream populations at Lee's Ferry to downstream populations in lower Grand Canyon. This was probably a reflection of availability. Trout appear to benefit from ingestion of Cladophora because of the associated epiphytic diatoms that colonize it. Cladophora forms the habitat for the energy rich diatoms and macroinvertebrates that inhabit it (Montgomery et al. 1986). Leibfried and Blinn (1986) and Usher et al. (1986) indicated that Cladophora beds below Glen Canyon Dam were susceptible to desiccation as a result of periodic dewatering.

Under the No Action Alternative, river operations may allow beds of Cladophora to be dewatered and desiccated over extended periods of time, especially over weekend periods of low flow. Maddux et al. (1987) observed that under drastically reduced flows, Gammarus were forced from cover and entrained in the drift making them available as forage to trout and other predators. This suggests that No Action could reduce the diversity of diet components available to salmonids. Decreasing flows may increase the availability of Gammarus to trout, but continued fluctuation over a longer term may reduce the overall productivity and in turn reduce the long term availability to trout.

Maddux et al. (1987) used length frequency distribution to estimate trout growth. Fish from Lee's Ferry and reaches above the confluence with the LCR are larger and grow faster than those from below the confluence area. The variation in growth may be associated with decreasing quantity and quality of food resources or decreasing primary productivity below the confluence with the LCR due to increased turbidity. There may also be genetic differences between the upstream and downstream populations of trout that could be reflected in growth differences (Claussen and Phillip 1986).

The fluctuating flows of No Action may limit production of algae and associated food organisms resulting in direct effects upon the potential for growth of rainbow trout (Leibfried and Blinn 1986, Usher et al. 1986). The periodic dewatering of stream banks and wide range of flows and velocities across stream beds have reduced macroinvertebrate abundance and community complexity in streams (Fisher and LaVoy 1972).

Native Fishes

Historically, the Colorado River through Glen and Grand Canyons supported a diverse native, big river fish fauna (See Table).

Table. Native fish species in Glen and Grand Canyons, including Federal Endangered Species Act (ESA) and/or State of Arizona Threatened and Native Wildlife in Arizona (TNW) Status.

SPECIES	ESA STATUS	TNW STATUS
humpback chub <u>Gila cypha</u>	endangered	endangered
Colorado roundtail <u>Gila robusta robusta</u>	Candidate; Category 2	not listed
bonytail chub <u>Gila elegans</u>	extirpated	endangered
Colorado squawfish <u>Ptychocheilus lucius</u>	endangered	endangered
razorback sucker <u>Xyrauchen texanus</u>	endangered (10/23/91)	endangered
bluehead sucker <u>Catostomus discobolus</u>	not listed	not listed
flannelmouth sucker <u>Catostomus latipinnis</u>	Candidate; Category 2	not listed

The humpback chub and razorback sucker were discussed in the Special Species section. The bonytail chub, Colorado squawfish, and roundtail chub have been extirpated from the project area. The remaining two, bluehead sucker and flannelmouth sucker, continue to persist in the area.

Spawning, Recruitment, and Habitat Suitability

Maddux et al. (1987) found ripe bluehead suckers in the lower reaches of Grand Canyon during the spring seasons. Flannelmouth suckers were found in reproductive condition in nearly all seasons except autumn.

Although both tributaries and main channel habitats are important spawning and nursery areas Minckley (1978), Carothers and Minckley (1981) reported highest densities of flannelmouth in and near tributary mouths. The highest concentration of reproductive flannelmouth were found in connected backwaters. Although flannelmouth in reproductive condition were sampled in all reaches of the river, viable larvae were only collected below Bright Angel Creek.

Habitat suitability for bluehead sucker appears to increase with distance from Glen Canyon Dam. Maddux et al. (1987) sampled bluehead sucker most frequently below National Canyon. Flannelmouth sucker were found most frequently in the lower reaches of Grand Canyon, although they were also captured near Lee's Ferry.

Maddux et al. (1987) indicated that runs over sand bottoms were apparently attractive habitats for adult as well as subadult blueheads and flannelmouth. Eddies were also utilized by these native fishes. In the Lee's Ferry reach, adult flannelmouth exhibited a preference for backwater areas. Larval bluehead and flannelmouth sucker were most often encountered in backwater areas. The backwater areas where larval bluehead sucker were captured were typically warmer than mainstem habitats, suggesting selection for warmer refugia. Maddux et al. (1987) noted that the number of eddies generally increased when flows dropped from 28,000 cfs to 4,800 cfs. At low flows backwater areas increased four fold over high flow conditions.

Food Resources and Growth

Both the flannelmouth and bluehead suckers are omnivorous (Carothers and Minckley 1981). Stomach contents of adult fish taken from the mainstem include midges, Gammarus, organic detritus, diatoms, and Cladophora.

Fisher and LaVoy (1972) indicate that macroinvertebrates and community complexity generally decline in response to fluctuations below hydropower facilities. Declining community complexity and productivity may result in a diminished food resource.

Under No Action, broad daily ranges of fluctuations would flush warm backwaters with cold mainstem waters, resulting in fluctuating temperature and velocity conditions within important nursery areas.

Little is known about growth patterns of many of Arizona's native species. Most native fish continue to utilize backwater areas, although by October they attain a size where they are less susceptible to fluctuating flows (Maddux et. al 1987). Maddux et al. (1987) noted that growth of the warmwater flannelmouth sucker was slow and variable for adult fish in the mainstem. Growth, and in turn recruitment, of larval native fishes may rely upon finding productive, warmer water refugia, like backwaters. Fluctuations may be more damaging during the reproduction or rearing seasons.

RIPARIAN AND WETLAND RESOURCES

The understanding of the importance of riparian and wetland habitats in the Southwest has grown considerably over the last two decades. These areas are understood to be among the most productive of wildlife habitats. The physical complexity and biological productivity of this streamside vegetation creates an environment with rich potential for biotic diversity. Because of this rich biotic potential, the AGFD categorizes these habitats as Resource Category I, unique and irreplaceable on a regional or statewide basis.

Vegetation along the Colorado River between Glen Canyon Dam and Lake Mead has changed radically since closure of the dam (Turner and Karpiscak 1980). The reduction of peak annual discharge has resulted in vegetation where it was absent because of the scouring effects of large annual floods. This new riparian area, called the New High Water Zone (NHWZ), is characterized by increased density of many species including exotics like salt cedar (Tamarix ramossissima) and camelthorn (Alhagi camelorum), and natives like arrowweed (Tessaria sericea), desert broom (Baccharis salicolia), and cattail (Typha sp.). Changes have also occurred in the deposits of sand and silt along the banks of the Colorado. Stevens and Waring (1988) documented significant losses in riparian vegetation in the NHWZ as a result of spill operations. Flooding also stimulated germination of NHWZ species, with salt cedar as a primary beneficiary.

The pre-dam riparian zone, sometimes referred to as the Old High Water Zone (OHWZ) is dominated by species including hackberry (Celtis sp.), mesquite (Prosopis sp.), and acacia (Acacia sp.). This zone was determined by historic flood conditions and is now well above normal dam operational stages. This zone appears to be in slow decline, lacking the annual flooding conditions necessary for recruitment. Chronic declines in the OHWZ have been noted for some time because of the lack of flood driven regeneration in that area.

There are at least two factors that influence the areal extent of riparian and wetland resources in Glen and Grand Canyons: the range of daily and monthly variation in flows and the erosion of the beach deposits that form the foundation of these communities. Reduction in the areal extent of the riparian vegetative community through either of these processes translates to a correlative effect upon terrestrial wildlife resources.

It was concluded in the final report of the Glen Canyon Environmental Studies (GCES) Phase I (USDI et al. 1988) that the direct effects upon terrestrial resources are most evident from flood operations. There may, however, be ongoing chronic effects of river operations under fluctuating flows that Phase I studies did not address such as root zone erosion on alluvial deposits in riparian areas. There is not yet the mechanism to measure the incremental portion of the chronic effects of fluctuating releases upon these riparian and wetland communities.

Under the No Action Alternative, the concern persists that broadly fluctuating river operations would reduce above water alluvial deposits (beaches and bars) in turn reducing riparian and wetland maintenance and associated wildlife communities in Glen and Grand Canyons.

FUTURE WITH THE PROJECT - PROPOSED ACTION

Modified flows consist of a minimum of 5,000 cfs, maximum flows of 20,000, ascending ramp rates of 2,500, descending ramp rates of 1,500, and daily fluctuation limits of 5,000, 6,000 or 8,000 cfs, depending on the volume of a low, medium, and high water month. The purpose of the Proposed Action is to reduce impacts of power operations on downstream physical and biological resources.

We now understand that the Interagency Agreement was signed on October 21 prior to the October 23 requested date for submission of comments by Reclamation and that exception criteria will be included in the Proposed Action to allow for system regulation, system emergencies, and for financial emergencies. Although the AGFD does not concur, the FWS does not support the addition of financial exception criteria. The FWS understands that the initiation of interim flows were to utilize GCES data to reduce environmental degradation in Glen and Grand Canyons and allow Reclamation in association and Cooperating Agencies to evaluate research flow data. Furthermore, the FWS does not believe that sufficient economic justification has been developed to warrant a 3% financial allowance. Financial exception criteria includes a 3% or 22-hour a month exception for power production. Western and Reclamation state that if implemented, this exception is not likely to occur more than one hour a month, and almost never more than 4 hours. However, a possibility exists for full peaking power for nearly one day a month. The FWS supports exception criteria for system regulation and system emergencies similar to the criteria used for GCES Research flows.

SPECIAL STATUS SPECIES

Humpback chub

It is unlikely that modification of operations as described by the Proposed Action will have detrimental direct effects upon the long lived population of adult humpback chub or have a more serious effect upon recruitment of chub than No Action (Patten et al. 1991). One concern is that if the Proposed Action with financial exception criteria dropped minimum flows below 5,000 cfs whereby

backwaters utilized as nursery areas may become isolated from the main channel. The potential for impact, while no greater than No Action, would persist and not meet the purpose of the Proposed Action.

Razorback Sucker

Like the humpback chub, direct impacts on resident adults of this species are not anticipated. The likelihood of impact from the Proposed Action may not be greater than the No Action Alternative.

Bald Eagle

Since no data have correlated trout access into Nankoweap Creek to river levels, the trout and bald eagles should be sustained under the Proposed Action. However, with the intent of maintaining and restoring the production of the aquatic food base for trout, the Proposed Action should improve the quality of forage available to eagles.

Peregrine Falcon

Influences on the peregrine falcon would parallel those to riparian and wetland areas. Because the Proposed Action is designed to reduce detrimental erosional effects of fluctuating flows on above water alluvial deposits in the river corridor through institution of decreased maximum flows and reduced down ramp rates, riparian and wetland areas in the NHWZ would be expected to be better maintained over the time span of Interim Operations. Maintenance of riparian and wetland areas and peregrine forage species should be improved.

FISHERY RESOURCES

Aquatic species can be expected to be directly affected by river operations. Main channel thermal characteristics are not anticipated to change during interim operations; however, where stable backwaters develop some differential warming may result.

Rainbow Trout

There are several habitat factors that may change as a result of Interim Flows. Minimum flows would maintain a broader zone for Cladophora colonization and its associated food resources and should maintain broader coverage of some spawning bars during the winter months. The reduced maximum flow would reduce discharge related velocities maintaining habitat availability for some life stages. Lastly, reduced down ramping rates may reduce the entrapment of trout in stranding pools. The Proposed Action should be advantageous over No Action.

Spawning, Stranding, and Recruitment

Increased minimum flows would provide additional coverage of spawning bars allowing for redd success. Reduced down ramp rates would provide trout improved opportunity to abandon dewatering redd sites that may become isolated. Reduced discharge velocities and reliably inundated redd sites have the potential to significantly improve habitat suitability for larval and juvenile trout. Persons et al. (1985) indicated the potential for entrainment of post-emergence fry in higher velocity main channel currents as a potential source of difficulty in recruitment.

The Proposed Action could reduce the mortality of adult fish due to stranding and potentially increase recruitment of naturally spawned trout. Reduced mortality of adults and increased recruitment of naturally spawned trout should be realizable during the time span of the Proposed Action.

Food Resources and Growth

Liebfried and Blinn (1986) indicated that the aquatic food base was dependent on substrate stability. Fluctuating flows eroded those substrates. Patten et al. (1991) asserted that while the liberation of organic material (Cladophora, Gammarus, and other potential food items) into the drift at higher rates might be advantageous over the short-term, the food base could be decimated over the long-term. Cladophora beds are maintained up to the level of minimum river stage, but if desiccation exceeded 12 hours significant degradation may result. Exception criteria with extended low flows may have the same result. Higher minimum flows were intended to restore the integrity of Cladophora beds which should provide improved habitat for associated aquatic food resources.

Higher minimum flows should improve the stability and productivity of the benthic food resources. It is probable to realize changes during the time span of the Proposed Action. The improved stability and diversity of those food resources should result in improved growth and condition factor of rainbow trout.

Native Fishes

The native fishes discussed in the preceding section of this report (bluehead sucker and flannelmouth sucker) are similar to the special status fishes in being long lived species. Resident adults will not likely be affected by the Proposed Action. The majority of effects will be related to reproduction and recruitment.

Spawning, Recruitment, and Habitat Suitability

Access to spawning sites probably will not change. Creek mouths will likely be no more nor no less accessible to spawners under the Proposed Action. High steady spring time flows make those habitats most accessible.

Backwaters and return flow channels where some differential warming is possible will continue to be most important for annual recruitment. Low flow conditions (below 8,000 cfs) suggest a limitation of available habitat. This would probably be exacerbated by exception criteria which would decrease the minimum flow below 5,000 cfs for extended periods of time, if they were exercised during critical periods.

Food Resources and Growth

It is anticipated that improved diversity and stability of the aquatic food resource as described for trout will improve conditions for natives fishes. Consideration must be given to the spiraling of nutrients in fluvial systems. It is likely that increased upstream productivity will result in increased export through drift of coarse particulate organic matter into less productive downstream reaches. Native fishes may benefit from improvement of in stream production of food organisms under the Proposed Action.

Improved condition associated with improving forage base should be notable within the duration of the Proposed Action, although actual changes in size distribution of native fishes may not be documentable.

RIPARIAN AND WETLAND RESOURCES

The reduced ramping rates (especially down ramps) and reduced maximum flows are designed to reduce the direct effects of river operations on above water alluvial deposits, wetlands, and adjacent riparian habitats. Thus, as the Proposed Action would meet its objective of preserving those alluvial deposits, the integrity of existing NHWZ riparian areas, with associated terrestrial wildlife, would be maintained. The OHWZ will not be affected, because the incidence of high flows of sufficient magnitude to reach the OHWZ will be no different than under No Action.

Fluctuating flows can, under some circumstances, result in the direct loss of individual animals. The loss of duck nests were documented in the project area during the spring of 1991 after a steady flow of 15,000 cfs was followed by fluctuating flows Dave Wegner (pers. comm.). Deviation from the intended Interim Flow should be minimized during riparian and wetland bird nesting seasons.

POTENTIAL IMPACTS OF OPERATING OUTSIDE OF THE INTERIM FLOW CRITERIA

It appears that the Proposed Action without financial exception criteria will accomplish its objectives to decrease the detrimental effects of river operations on the terrestrial and aquatic ecosystems of Glen and Grand Canyons.

Exceeding the maximum flow

Flows greater than 20,000 cfs may increase sediment transport, erode elevated beach deposits, and damage archeological and historic resources. Because of the presence of the dam and limited sediment input, the stability of downstream beaches depend not on the rate of replenishment but on the reduction of erosion. Erosion rates increase exponentially with increasing and fluctuating flows (See Table Below).

Table. Tons of Sediment Transported per Year Under Various Flow Regimes

<u>Minimum Flow</u>	<u>Maximum Flow</u>	<u>Average Flow</u>	<u>Tons of sediment</u>
11,400	11,400	11,400	200,000
11,400	26,000	3,000	1,000,000

Dropping below the minimum flow

Flows below 5,000 cfs may dewater trout spawning beds, limit recreational fishing access in the Lee's Ferry area, dewater or desiccation of backwaters, and desiccate Cladophora beds and aquatic invertebrates. The number of backwaters decline as flows fall below 8,000 to 10,000 cfs.

Exceeding the daily fluctuation limit

Wide daily fluctuations greater than 5,000 to 8,000 cfs may not allow sufficient time for drainage of bank storage of beaches resulting in losses to riparian habitat, strand fish, flush young humpback chub out of the Little Colorado River, create wide temperature fluctuations in backwaters, erode aquatic food resources, increase sediment erosion, undermine riparian and emergent marsh vegetation, and impact riparian and terrestrial species and habitat, including rare birds and vegetation patch sizes.

Exceeding ramping rates

Ascending ramp rates above 2,500 cfs and descending rates below 1,500 cfs may strand fish, create hazards for recreational fishing, and separate beach faces. In narrow reaches 2,500 cfs equals approximately 1.5 feet whereas 1,500 cfs equals approximately .75 feet. These should serve as threshold levels of fluctuations.

Conclusions

Although the magnitude, duration, and frequency of system emergencies and system regulation is not known, the FWS acknowledges and supports the need for implementation. A similar requirement has not been demonstrated for financial exceptions and we do not support their implementation. The FWS continues to believe power needs can be met without financial exceptions.

RECOMMENDATIONS

As described in the previous section, there are several conditions related to financial exception criteria that need to be resolved. As indicated earlier, the FWS questions the appropriateness of financial exception criteria. In most cases, the exceptions exercised should be transitory events that would have little effect upon the expected benefits of the Proposed Action. However, as those events become chronic (either through frequent repetition or extended duration) or acute, their importance would be elevated. As a result, we recommend the following:

- 1) The FWS supports exceptions for system emergencies and system regulation only. The FWS does not support financial exception criteria. We do not believe financial exceptions would be in consonance with the intent of the interim flow legislation "...to protect, mitigate adverse impacts to, and improve the condition of, the environmental, cultural, and recreational resources of Grand Canyon National Park and Glen Canyon National Recreation Area downstream of Glen Canyon Dam..." (U.S. H.R. 814, 1991).
- 2) The effects of all exceptions should be closely documented for both environmental and financial costs where possible. The monitoring program should include events which can be measured over the life of this project and keyed to specific measurable indicators. The results of monitoring should be used to amend exception criteria and adapt operations, where appropriate.
- 3) Recovery from exception conditions should be ameliorated to the extent practicable. While the trigger for an exception event may be sudden and unplanned for, recovery should take place along pre-planned guidelines with an emphasis on ramping rates and daily fluctuation limits.
- 4) Bypass should be evaluated as a mechanism to ameliorate any rapid down ramp employed during exceptions when practicable, and bypass and spinning should be incorporated in all exceptions to maintain minimum flows.

The FWS appreciates the efforts of Reclamation and the Cooperating Agencies to develop a well-coordinated Interim Flow plan and the opportunity to provide this planning assistance to Reclamation. As a Cooperating Agency, the FWS will continue to work toward developing a comprehensive and conclusive Interim Flow

program and monitoring plan. We look forward to further coordination in all aspects of the Interim Flow process. If we can be of further assistance, please contact Debra Bills, Don Metz, or me (602/372-4720 or FTS 261-4720).



Sam F. Spiller

Attachments

cc:

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Superintendent, Grand Canyon National Park, Grand Canyon, Arizona
Superintendent, Glen Canyon National Recreation Area, Page, Arizona
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Hopi Tribal Council c/o SWCA Flagstaff, Arizona
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ATTACHMENT D

INTERAGENCY AGREEMENT BETWEEN

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
SALT LAKE CITY AREA

AND

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
UPPER COLORADO REGION

GLEN CANYON DAM EXCEPTION CRITERIA
AND ASSOCIATED INTERIM OPERATING PROCEDURE

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GLEN CANYON DAM EXCEPTION CRITERIA
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INTERAGENCY AGREEMENT

BETWEEN

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
SALT LAKE CITY AREA

AND

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
UPPER COLORADO REGION

GLEN CANYON DAM EXCEPTION CRITERIA
AND ASSOCIATED INTERIM OPERATING PROCEDURE

1. PREAMBLE

THIS AGREEMENT is made this 21 day of October, 1991, pursuant to the Acts of Congress approved June 17, 1902 (32 Stat. 388); April 11, 1956 (70 Stat. 105); August 4, 1977 (91 Stat. 565); the Transfer of Functions and Property Agreement, dated March 26, 1980; and Acts amendatory or supplementary to the foregoing Acts; between THE UNITED STATES DEPARTMENT OF ENERGY, Western Area Power Administration, hereinafter called "Western," represented by the officer executing this Agreement or a duly appointed successor, and THE UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Reclamation, hereinafter called "Reclamation," represented by the officer executing this Agreement or a duly appointed successor; each sometimes hereinafter individually called Party, or both sometimes hereinafter collectively called the Parties.

2. EXPLANATORY RECITALS

2.1 Reclamation is a Federal agency with management responsibilities for dam operations and power generation at Glen Canyon Dam.

- 1 2.2 Western is a Federal agency responsible for the marketing and
2 delivery of power and energy from Glen Canyon Dam.
3
- 4 2.3 Reclamation and Western have entered into the aforementioned
5 Transfer of Functions and Property Agreement which, among other
6 things, delineates each Party's responsibilities for power
7 system operations including provision of operating reserves,
8 development of schedules, optimizing reserve generation, and
9 cooperation in controlling system voltage.
10
- 11 2.4 Reclamation and Western have joint responsibilities in managing
12 the Upper Colorado River Basin Fund (Basin Fund) consistent
13 with sound business principles.
14
- 15 2.5 Reclamation, as a representative of the Department of the
16 Interior, has a trust responsibility to the Indian tribes and
17 their resources associated with the Grand Canyon area and the
18 operation of Glen Canyon Dam.
19
- 20 2.6 Western has entered into firm electric service contracts with
21 various entities committing the sale of Colorado River Storage
22 Project (CRSP) firm power and energy.
23
- 24 2.7 On July 30, 1991, the Commissioner of Reclamation announced
25 Glen Canyon Dam Test Flows (Test Flows) which set forth new
26 Test Flows and Interim Operating Criteria for water releases
27

1 from Glen Canyon Dam with the objective of protecting
2 downstream resources.

3
4 2.8 Reclamation and Western have an obligation to give
5 consideration to the impacts of Test Flows and subsequent
6 Interim Operating Criteria on revenues in the Basin Fund.

7
8 2.9 Reclamation is requiring Western to adhere to the Test Flows
9 and subsequent Interim Operating Criteria except for the
10 situations described herein.

11
12 2.10 The following Exception Criteria and associated operational
13 procedures (Procedures) have been jointly prepared and agreed
14 to by Western and Reclamation, after consultation with the
15 Cooperating Agencies and interested parties involved with the
16 development of the Glen Canyon Dam Environmental Impact
17 Statement (EIS), for use during the Test Flows and subsequent
18 interim operations. These Procedures are intended to be
19 applicable to subsequent Interim Operating Criteria as directed
20 by the Secretary of the Interior. A list of Cooperating
21 Agencies is attached hereto as Exhibit A.

22
23 3. AGREEMENT

24 The Parties agree to the terms and conditions set forth herein.
25
26
27

1 4. TERM OF AGREEMENT

2 4.1 This Agreement shall become effective on the date of execution
3 and shall remain in effect until the date of implementation of
4 the record of decision associated with the Glen Canyon Dam EIS.

5
6 4.2 The provision of Unloaded Capacity pursuant to Section 8.2 of
7 this Agreement will be initially for the period from the date
8 of execution and for 90 days thereafter; Provided, That those
9 provisions will be amended or they shall continue in full force
10 and effect for the period(s) thereafter, as agreed upon by the
11 Parties and in consultation with the Cooperating Agencies.

12
13 4.3 The Parties and the Cooperating Agencies shall periodically
14 review, not less often than every 3 months, operations under
15 this Agreement, and the Parties hereto shall put into effect
16 such modifications as a result of such review, which
17 modifications shall be evidenced by amendment to this
18 Agreement. Western and Reclamation will regularly report to
19 the Glen Canyon Dam EIS Cooperating Agencies at Cooperating
20 Agency meetings on the actual operations under this Agreement,
21 use of Exception Criteria, and identifiable impacts associated
22 with the use of Exception Criteria.

entity's system at a decreased cost and with greater reliability in meeting WSCC criteria.

2
3
4 5.6 Integrated Value Across the Hour with reference to generation
5 measurement means that the generation, and the corollary water
6 releases, are measured by summing the total deviations with
7 time across the hour and dividing this number by the total
8 number of deviations in the hour.
9

10 5.7 Interim Operating Criteria or Test Flows are described in
11 Exhibit D, attached hereto.
12

13 5.8 North American Electric Reliability Council (NERC) was formed
14 in 1968 to promote the reliability of bulk electric supply by
15 the electric systems of North America; to conduct interregional
16 studies which relate to the reliability of the bulk electric
17 systems and to make information appropriately available; to
18 encourage and assist the development of interregional
19 reliability arrangements among Regional Electric Reliability
20 Councils and their members; to exchange information with
21 respect to planning and operating matters relating to the
22 reliability of bulk electric supply; and to review periodically
23 regional and interregional activities on reliability. Western
24 is required to report monthly to NERC as to system control
25 performance.
26
27

1 5.9 Regulation Control is the use of automatic generation control
2 to adjust the power output of electric generators within a
3 prescribed area in response to changes in the system frequency,
4 time error, and tie-line loading, so as to maintain the
5 Scheduled Level of generation in accordance with prescribed
6 NERC criteria. This results in instantaneous changes in the
7 Glen Canyon Dam generation.

8
9 Regulation Control is used at Glen Canyon Dam as a real-time-
10 computer-driven change to the hourly schedule. These changes
11 which occur many times during the hour are both positive and
12 negative in relation to the schedule. The resulting output
13 from Glen Canyon generators is an envelope of generation swings
14 that are frequent, small in magnitude, and the mean of which
15 approximates the original schedule.

16
17 5.10 Scheduled Level is an established hourly programming of the
18 Glen Canyon Dam generation.

19
20 5.11 System Emergency is defined under Guide III. of the NERC
21 Operating Procedure. In general, System Emergencies involve
22 the loss of either a significant generation resource or a
23 significant transmission resource that leads to an imbalance in
24 the delivery, frequency, or voltages of power supply.

25
26 5.12 Unloaded Capacity is that operable capacity at Glen Canyon
27 which is physically able but not presently serving load.

1 5.13 Western Systems Coordinating Council (WSCC) is one of nine
2 regional electric reliability councils of NERC and covers most
3 of all of 11 western states, two Canadian provinces, and a
4 small portion of Mexico.
5

6 6. POWER SYSTEM OPERATIONS

7 6.1 Pursuant to Western's firm electric service contractual
8 commitments and in accordance with the guidelines and criteria
9 of the NERC, WSCC, and revised IPP operating agreement,
10 Adequate Generating Capacity must be available to meet system
11 regulation needs, maintain transmission reliability, maintain
12 operating reserve requirements, and serve firm load
13 requirements.
14

15 6.2 In consideration of power operating guidelines and criteria,
16 and in accordance with the following provisions of this
17 Agreement, Reclamation will make Unloaded Capacity available
18 from the Glen Canyon Dam Powerplant to the power system under
19 Emergency Situations so that Western can continue to operate
20 within utility industry standards. For emergencies greater
21 than one hour's duration, the procedures to resume operations
22 consistent with Interim Operating Criteria are described in
23 Exhibit B, attached hereto.
24

25 6.3 This Procedure at Glen Canyon Dam shall be implemented in order
26 to provide adequate, reliable, and secure services, and to
27 avoid replacement capacity purchases which would become

1 necessary if the Glen Canyon Dam Interim Operating Criteria
2 were adopted without Exception Criteria.

3
4 6.4 Western shall, in all instances where the requirements to
5 exceed Interim Operating Criteria are known sufficiently in
6 advance, notify Reclamation and the Cooperating Agencies of its
7 intent to utilize Unloaded Capacity.

8
9 7. EMERGENCY SITUATIONS AND REGULATION

10 7.1 Glen Canyon Dam generation shall continue to be available to
11 respond to CRSP System Emergencies as well as to applicable
12 interconnected System Emergencies as defined by the NERC, WSCC,
13 or as required pursuant to the IPP Agreement.

14
15 7.2 If a purchased or supplemental resource becomes unavailable to
16 Western, it is agreed that Glen Canyon Dam generation will be
17 available to support firm load until another source of energy
18 can be found. The generation at Glen Canyon Dam will continue
19 to be called upon only as a last resort and will be increased
20 only if other available CRSP or other available generation has
21 been utilized to maximum allowable levels. Under an
22 unavailable resource scenario, Western will call for
23 replacement resources from other interconnected utilities
24 and/or generation from other Western offices in accordance with
25 standard utility practice. While additional resources are
26 being located, other available CRSP generation will be brought
27 on-line as needed or to the maximum allowable extent to cover

1 load. If additional generation is needed, Glen Canyon Dam
2 generation will then be increased up to the level needed.

3
4 7.3 Western will continue to respond to National Park Service
5 requests for changes in releases for humanitarian reasons
6 (i.e., rescue and recovery activities).

7
8 7.4 Should conditions arise pursuant to Sections 7.1, 7.2, or 7.3
9 of this Agreement which require changes to Glen Canyon Dam
10 generation outside of Interim Operating Criteria, generation
11 will be restored at Glen Canyon Dam within appropriate Interim
12 Operating Criteria in accordance with the provisions of Exhibit
13 B of this Agreement. (Many times this can be accomplished
14 within 15 minutes, and only under extraordinary conditions
15 would this require more than 1 hour.) If, as a result of an
16 Emergency Situation, generation at Glen Canyon is lost,
17 generation will be restored as soon as possible. Releases
18 without generation will be made through the turbines or by-pass
19 valves as necessary to restore the minimum-release level only
20 after it has been determined that generation cannot be restored
21 within a 1-hour time frame. If it is anticipated that
22 increased Glen Canyon Dam generation will be needed to support
23 firm load requiring operations outside of Interim Operating
24 Criteria for more than 1 hour, respective operating supervisors
25 will be alerted in accordance with the calling list attached as
26 Exhibit C of this Agreement.

1 7.5 Adequate generation for regulation purposes will be provided at
2 Glen Canyon Dam and other CRSP facilities pursuant to current
3 power system operation practices, and generation will be
4 measured as an Integrated Value Across the Hour. It is agreed
5 that during Interim Operating Criteria, to the extent
6 allowable, the Curecanti and/or Flaming Gorge units may be
7 placed on Regulation Control in addition to Glen Canyon units.

8
9 7.6 Western will determine which CRSP plants will be placed on
10 Regulation Control by Reclamation, taking into consideration
11 sufficient water and associated generation that must be made
12 available to maintain control area needs on an hourly basis.
13 If a spill situation at the Crystal Dam becomes likely,
14 Western/Reclamation will consult regarding water conservation
15 and other purposes.

16
17 7.7 For purposes of monitoring compliance with this Procedure, the
18 Page Supervisory Control and Data Acquisition System will be
19 the measure of all interim release flows from Glen Canyon Dam.
20

21 8. OPERATIONS, PERFORMANCE, AND EVALUATION

22 8.1 Western will make every effort to adhere to Interim Operating
23 Criteria under normal system-operating conditions.

24
25 8.2 Western will purchase nonfirm energy (interruptible without
26 capacity) to satisfy its contractual delivery requirements for
27 firm load. Reclamation will continue to make Unloaded Capacity

1 at Glen Canyon Dam outside of Interim Operating Criteria
2 available so that energy purchases can be made on a nonfirm
3 basis to avoid the higher cost of firm power purchases.
4

5 8.3 On occasions when the need to exceed Interim Operating Criteria
6 can be anticipated by Western, every effort will be made to
7 avoid such exceedances during periods of special resource
8 sensitivity. A listing of sensitive resources and periods of
9 vulnerability are described in Exhibit E to this Agreement.
10 Exhibit E will be subject to refinement during the periodic
11 meetings described in Section 4.3 and the monthly meetings
12 described in Section 9.1.
13

14 8.4 Reclamation and Western will review the number of hours in
15 which the Interim Operating Criteria were exceeded for the
16 specific purpose of avoiding a high-cost replacement power
17 purchase purposes for any consecutive 30-day (rolling time)
18 period. If in any 30-consecutive-day period, operations to
19 avoid high-cost replacement power purchases exceed Interim
20 Operating Criteria for more than 3 percent of the 30
21 consecutive days, the Secretary of the Interior shall suspend
22 Section 8.2 above, upon 30 days' written notice to Western.
23 After investigation of cause and consultation with the
24 Cooperating Agencies, the Secretary of the Interior may
25 reinstate Section 8.2 above. After such notification and for
26 the period of suspension, only Exception Criteria for system
27 regulation and Emergency Situations shall remain.

1 8.5 Reclamation and Western agree that the use of Exception
2 Criteria for financial reasons will not establish a precedent
3 for future decisions regarding operating procedures for Glen
4 Canyon Dam after publication of a final EIS and Record of
5 Decision.

6
7 8.6 Reclamation and Western agree that Basin Fund revenues will be
8 used to fund an adequate scientific monitoring program
9 associated with this Agreement.

10
11 9. COORDINATION AND REPORTING

12 9.1 At least monthly, the Salt Lake City Area Manager of Western
13 and the Upper Colorado Regional Director of Reclamation, or
14 their designated representatives, will meet to discuss Interim
15 Operating Criteria and the effects of the Interim Operating
16 Criteria on Western's and Reclamation's operations and
17 maintenance budgets. When analysis of future net expenses and
18 available cash resources indicates the potential for violation
19 of the Anti-Deficiency Act, appropriate measures (recognizing
20 the lead time for implementing these measures) including, but
21 not limited to, deferring or rescheduling Discretionary
22 Programs, implementing rate adjustments, seeking supplemental
23 appropriations, and employing other cash management practices
24 consistent with sound business principles would be taken so
25 that the Basin Fund is not deficient. Western and Reclamation
26 operations and scientific personnel and representatives of the
27 Cooperating Agencies will coordinate and as necessary meet to

1 identify any use of Exception Criteria and impacts of specific
2 occurrence(s); and to identify effects and provide
3 recommendations for the meetings described in this section.
4

5 9.2 Operational communications between Western and Reclamation will
6 continue through daily morning reports submitted by Western.
7 These morning reports list any system disturbances that may
8 have affected CRSP operations during the preceding 24 hours.
9 In accordance with the provisions of Exhibit C, Reclamation
10 will be notified when use of Exception Criteria occurs so that
11 evaluation of the effects can be noted.
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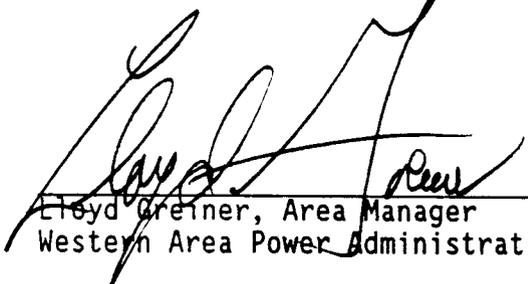
10. SAFETY

Human safety will not be compromised in order to preserve Interim Operating Criteria.

11. EXHIBITS

Inasmuch as certain provisions of this Interagency Agreement may change during the term hereof, they may be set forth in exhibits from time-to-time agreed upon by the Parties. The initial Exhibits A, B, C, D and E, and all future exhibits shall be attached hereto and made a part hereof, and each shall be in full force and effect in accordance with its terms unless superseded by a subsequent exhibit.

IN WITNESS WHEREOF, the Parties hereto have caused this Interagency Agreement to be duly executed the day and year first above written.

By: 
Lloyd Greiner, Area Manager
Western Area Power Administration

By: 
Roland Robison, Regional Director
Bureau of Reclamation

EXHIBIT A
COOPERATING AGENCIES

1. Arizona Game and Fish Department
2. Bureau of Indian Affairs
3. Bureau of Reclamation
4. Department of the Interior
5. Fish and Wildlife Service
6. Havasupai Indian Tribe
7. The Hopi Tribe
8. Hualapai Indian Tribe
9. National Park Service
10. The Navajo Nation
11. Western Area Power Administration

EXHIBIT B

PROCEDURES TO RESUME INTERIM OPERATIONS
FOLLOWING AN EXCEPTION CRITERIA EVENT

1. An event causing releases to be less than minimum flows for periods exceeding 1 hour's duration:
 - a. Return to the current Scheduled Level as quickly as possible if the Scheduled Level can be attained in less than 4 hours. If return to the current Scheduled Level is initiated after 4 hours, ramp up at no greater than 2,500 cfs per hour or at an appropriate rate for resource benefits as agreed upon between Western and Reclamation operations and scientific personnel.
 - b. Use by-pass valves to achieve or maintain a 5,000 cfs minimum (release below a 5,000 cfs minimum for humanitarian emergencies may be an exception).
2. An event causing releases to exceed maximum flows for periods exceeding 1 hour's duration:
 - a. Return to the current Scheduled Level as quickly as possible if the Scheduled Level can be attained in less than 2 hours. If return to the current Scheduled Level is initiated after 2 hours, ramp down at no greater than 2,500 cfs per hour or an appropriate rate for resource benefits as agreed upon between Western and Reclamation operations and scientific personnel.
 - b. If generation cannot follow downramp rate, the by-pass valves may be used to meet downramp requirements.

3. If specific seasonal or ecosystem components require it, the agreed-upon return to Interim Operating Criteria may be modified from the above-stated numbers. The specifics will be discussed during meetings between Western and Reclamation operations and scientific personnel and representatives of the Cooperating Agencies described in Section 9.1 of this Agreement.

EXHIBIT C
CALLING LIST

This calling list shall be used when system conditions exist pursuant to Sections 7.4, 8.2 and 8.4 of this Agreement.

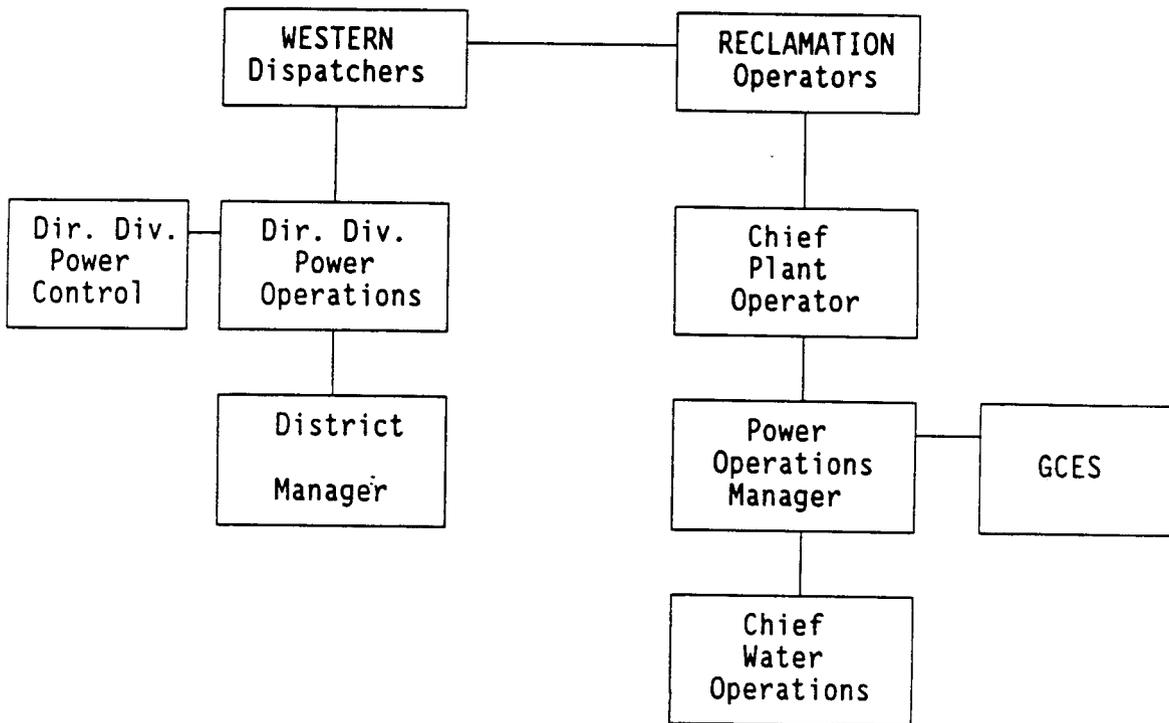


EXHIBIT D
INTERIM OPERATING CRITERIA

1. On July 30, 1991, Reclamation implemented the following test of Interim Operating Criteria:

Parameter

Maximum Flow	20,000 cfs ¹
Minimum Flow	5,000 cfs - nighttime 8,000 cfs - 7 a.m. to 7 p.m. ²

Ramp Rates

Ascending	8,000 cfs/4 hours not to exceed 2,500 cfs/hour
Descending	1,500 cfs/hour

Daily Fluctuations 5,000/8,000 cfs³

2. These Interim Operating Criteria can be amended from time to time by the Secretary of the Interior.

¹ To be evaluated and potentially increased as necessary for years when delivery to the Lower Basin exceeds 8.23 maf.

²The 8,000 cfs minimum flow requirement from 7 a.m. to 7 p.m. will be shifted to 8 a.m. and 8 p.m. respectively beginning the last Sunday in October and ending the first Sunday in April, Arizona local standard time.

³ Daily fluctuation limit of 5,000 cfs for months with release volumes less than 600,000 af, 6,000 cfs for monthly release volumes of 600,000 to 800,000 af and 8,000 cfs for monthly volumes over 800,000 af.

EXHIBIT E

CRITICAL ECOSYSTEM ELEMENTS
GLEN AND GRAND CANYONS

1. The Interim Operating Criteria have been designed to reduce the impact of Glen Canyon Dam operations on the natural resources in the Glen and Grand Canyons. Deviations from the Interim Operating Criteria may affect the resources of concern. The level of impact will vary depending upon the magnitude, duration, timing and frequency of the deviation.
2. The natural resources in the Glen and Grand Canyons will have varying levels of impact depending on time of the year and extent of the flow change. The information presented below is to be used by the operators of both Western and Reclamation in their decision process as related to deviations from the interim operations. During the months of greater potential resource impacts, additional coordination should be sought from the Environmental Studies' scientists prior to initiating an exception to the interim operations.
3. Listed below are critical periods of time for selected natural resources in the Glen and Grand Canyons.

Deviations Lower Than the Minimum (5,000 cfs)

<u>Resource</u>	<u>Impact</u>	<u>Critical Period</u>
Trout	Stranding adults Stranding eggs	December - March December - March
Cladaphora	Freezing Desiccation	December - February June - August
Native Fish	Larval stranding	May - August
Vegetation	Desiccation	May - September

Deviations Higher than the Maximum (20,000 cfs)

<u>Resource</u>	<u>Impact</u>	<u>Critical Period</u>
Vegetation	Flooding	May - June
Insects	Flooding	May - September
Waterfowl	Flooding nests	May - June
Passerine Birds	Flooding nests	May - June
Native Fish	Washed out of backwaters	March - October
Reptiles	Flooding	May - September

4. The resources and impacts listed above represent both critical resources and indicators for the ecosystem. The Procedures to Resume Interim Operations Following an Exception Criteria (Exhibit B) should be used in general to return to Interim Operating Criteria following an exception. However, during the critical periods identified above, all efforts should be made to avoid deviating from the interim operations levels. If an exception from interim operations occurs, the Environmental Studies' scientists should be contacted to provide additional guidance on how to return to the Interim Operating Criteria. If contact cannot be established, the criteria defined in Exhibit B should be followed.
5. As additional data from the Environmental Studies are collected and analyzed, modification of the above stated resources will be made as appropriate.

ATTACHMENT E
LETTERS OF COMMENT

ATTACHMENT E

LIST OF LETTERS OF COMMENT ON THE
GLEN CANYON DAM INTERIM OPERATING CRITERIA
DRAFT ENVIRONMENTAL ASSESSMENT

Letter No.	Entity or Individual	Date of Letter
1	Grand Canyon Trust Flagstaff, Arizona	10/9/91
2	Grand Canyon River Guides Flagstaff, Arizona	10/10/91
3	Regional Environmental Officer Department of the Interior Office of Environmental Affairs San Francisco, California	10/11/91
4	Manager of Environmental and Governmental Affairs Department of Water and Power the City of Los Angeles Los Angeles, California	10/11/91
5	Game and Fish Department The State of Arizona Phoenix, Arizona	10/11/91
6	Western Area Power Administration Department of Energy Salt Lake City, Utah	Undated Received 10/11/91
7	Colorado River Energy Distributors Association Salt Lake City, Utah	10/15/91
7a	Colorado River Energy Distributors Association Salt Lake City, Utah	8/20/91
7b	Colorado River Energy Distributors Association Salt Lake City, Utah	9/27/91
8	Page Electric Utility Page, Arizona	10/17/91
9	Mayor Kanab City Kanab, Utah	10/17/91

Letter No.	Entity or Individual	Date of Letter
10	Hualapai Tribal Council Peach Springs, Arizona	10/18/91
11	The Hopi Tribe Cultural Preservation Office Kykotsmovi, Arizona	10/18/91
11a	The Hopi Tribe Cultural Preservation Office Kykotsmovi, Arizona	10/24/91
12	Garkane Power Association, Inc. Richfield, Utah	10/18/91
13	Jack Maxwell Commissioner of Kane County Glendale, Utah	10/17/91
14	Dixie - Escalante Rural Electric Association, Inc. Beryl, Utah	10/18/91
15	Phoenix Area Director Bureau of Indian Affairs U.S. Department of the Interior Phoenix, Arizona	10/18/91
16	Upper Colorado River Commission Salt Lake City, Utah	10/18/91
17	Tri-State Generation and Transmission Association, Inc. Denver, Colorado	10/18/91
18	National Park Service U.S. Department of the Interior Washington, DC	10/23/91
19	America Outdoors Flagstaff, Arizona	10/12/91

All comments were considered; text changes were made where deemed appropriate.

LETTER 1

BOARD OF TRUSTEES

James Trees
Chairman
 Edward M. Norton
President
 Bert Fingerhut
Secretary-Treasurer

October 9, 1991

Bruce Babbitt
 Anne K. Bingaman
 Landon Butler
 Robert Elliott
 David H. Getches
 John D. Leshy
 Chase N. Peterson
 John P. Schaefer
 William B. Smart
 Steven Snow
 Stewart L. Udall

Mr. Roland Robison
 Bureau of Reclamation
 Upper Colorado Regional Office
 P.O.Box 11568
 Salt Lake City, Utah 84147

Dear Mr. Robison:

Thank you for the opportunity to comment on the Draft Environmental Assessment for Interim Operating Criteria at Glen Canyon Dam. Following are our comments, concerns, and suggestions for the draft document.

GENERAL COMMENTS

The Grand Canyon Trust supports a proposed action that characterizes the existing "test interim flows" as described in the Low Fluctuating Flow Alternative. We do not, however, support the incorporation of Financial Exception Criteria at this time.

It is our position that the request from Western for financial exceptions to the interim flows is without justification in theory or fact. We believe the best way to test and measure the economic impacts assessed by Western is to deny their request at the present, implement interim flows as outlined in the proposed action, and then determine if the exception is really needed. Our position is based on a study prepared by David Marcus, entitled Exceptions to the August 1991 Glen Canyon Dam Operating Criteria, October 2, 1991. (See Appendix 1.)

SPECIFIC COMMENTS

There are several comments and questions we have relating to specific items in the draft document. These are:

1. On page II-3 the EA states "These financial exception criteria would not set a precedent for future operations that may result from the GCDEIS." How will this condition be implemented and enforced? What will be the actual element or process that governs that the exception criteria will not drive an operating alternative in the final EIS?. How will you control

for this?

2. On page II-3, under Monitoring Program, the EA states that the basis of "this" monitoring program would be the ecosystem processes and responses, and that the program is built around monitoring both critical and representative elements already being evaluated through the ongoing GCES research. The document also indicates that due to the limited duration of the interim operating criteria, the focus would be on the short-term responses and the specific ecosystem elements. In the following paragraph the EA states that no new research efforts are anticipated to support the assessments of the interim operating criteria.

Thus, our question is: Does the existing research "focus" on short-term responses and the specific ecosystem elements? This is a critical question if there is to be no new research implemented.

3. Table 3. contains two footnotes that describe environmental impacts. These impacts are classified as "slight" (#4) and as a savings of \$19 million (#5). What is the definition of slight? Nowhere else within the document is the term described, quantified, or explained in terms of an impact. Also, the \$19 million savings is just an estimate and not an actual result. The assessment in this table treats this figure as though it was a proven fact and mis-represents the analysis.

4. Under the description of Assumptions on page III-1, the first one presented is very confusing. In the introduction it is explained that the existing conditions described are the No Action Alternative. Then the first assumption states that the impacts of the No Action Alternative are considered to be equivalent to the continuing impacts under the existing conditions.

Are the existing conditions discussed in the introduction the same as those in the first assumption? And if so, what is this assumption really stating?

5. The Resources section (page III-3) states that esthetics values would not be discussed. However, it is critical that esthetics values be a part of the recreation resource evaluation. Further in the document there is a discussion on the value of the natural environment held by recreationists. In fact, the Grand Canyon and Glen Canyon are described as "magnificent natural settings," and are evaluated as being impaired under the existing fluctuation scenario.

6. Within the Sediment section (page III-9) the use of the terms "minor," "infrequent," and "small increase" are used to describe impacts and results. These kind of terms need to be defined, quantified, and explained with established parameters so

the reader can ascertain the actual result.

7. On page III-9, within the Financial Exception Criteria Option, the last sentence talks about "this" impact. From the context of the paragraph's discussion it is assumed that "this" refers to impacts of down-ramping. The analysis falls short of discussing the impact caused by possibly (small increase) going over the 20,000 cfs threshold.

8. When describing the possible impacts that could result from the Financial Exception Criteria Option, the analysis document uses the comparison with the Low Fluctuating Flow Alternative when the affect would be "greater," "comparable," or not measurable. However, the No Action Alternative is used for the basis of comparison when the affect would be "less."

The Low Fluctuating Flow Alternative should not be used as a basis of comparison when the document states up front (page III-1) that the No Action Alternative is the baseline for determination of impacts. Also, the document describes exact impacts when there really is no knowledge as to exactly what flows would be produced under the Financial Exception Alternative. It is best to state that the impact is unknown because the type of operation patterns are unknown.

9. On page III-13, under the Financial Exception Criteria Option, the EA states that the flow fluctuations associated with "this" (Fisheries - Low Fluctuating Flow Alternative with Exception) option would adversely impact fishes during their spawning and early life stages by dewatering redds or inundating backwaters. Then the analysis disclaims the impact because the duration would be less than that under the No Action Alternative. Again, there has been no evidence as to the character of the flows under a Financial Exception; thus, there cannot be an assessment of the impact other than an unknown result.

10. Under the Anglers And Day-Use Rafters analysis (page III-19) the Low Fluctuating Flow Alternative Consequences site an example of NPS policies, such as governing the total recreational use of the Grand Canyon and launch schedules as an assumption existing under the No Action Alternative. To use Grand Canyon policies for boating restrictions in the Glen Canyon reach is not proper. A Glen Canyon National Recreation Area policy is better suited for the assumption.

11. The entire analysis for the White-Water Boaters under the Low Fluctuating Flow Alternative Consequences (page III-21) focuses on the loss of beaches. It is important to stress also the natural setting, which includes wildlife habitat and the chance to see a rare animal in the wild, the knowledge of the existence of unique qualities (such as cultural values, vegetation, historic values,

Interim Flow EA Comments - 4

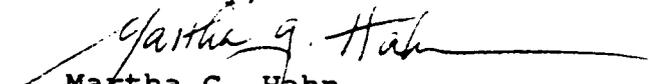
etc.) and the esthetics of a natural wonder.

12. Under the Financial (Marketing) Impacts (page III-24) the economic impact is analyzed on the "estimated" costs determined by Western's calculations. However, a "savings" analysis has been presented as an actual result based on an estimated calculation.

The impact analysis should present only estimated (not actual) results.

In conclusion, we hope that the previous comments and questions will be addressed in the development of a final assessment document. We look forward to your response.

Sincerely,



Martha G. Hahn
Vice President for Conservation

LETTER 2

October 10, 1991



Roland Robison
Regional Director
Bureau Of Reclamation
Upper Colorado Region Office
P.O. Box 11568
Salt Lake City, UT 84147

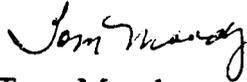
Dear Mr. Robison:

Enclosed are the comments of Grand Canyon River Guides on the Glen Canyon Draft Environmental Assessment and Revised Exception Criteria.

- We endorse the adoption of the proposed action, the Low Fluctuating Flow Alternative.
- We endorse the inclusion of exception criteria for emergency conditions and system regulation.
- We do not endorse the financial exception criteria at this time and suggest that this exception be looked at again at a later date.
 - We feel that the present justification for this exception is inadequate, the costs are based on questionable assumptions, and the real economic impacts are uncertain.
 - The risks to the downstream resources have not been correctly identified especially with regard to recreation use.
- The monitoring program should be more clearly defined. Accurate monitoring and evaluation of the effect on hydropower resources as well as downstream resources is critical.

Thank you very much for the opportunity to comment.

Sincerely,



Tom Moody,
President

cc: enclosed list

*Dedicated to the quality of the
Grand Canyon Experience*

P.O. Box 1934
Flagstaff, AZ 86002
(602) 773-1075

Copies sent to:

Cooperating Agency Representatives

Jerry Mitchell, NPS
Jim Young, F&WS
Sam Spiller, F&WS
Ken Maxey, WAPA
Dave Sabo, WAPA
Pat Port, Environmental Affairs
Amy Heuslein, BIA
Peter Deswood, Navajo
Leigh Jenkins/Nat Nutongwea, Hopi
Don Bay, Hualapai
Don Watahomigie, Havasupai
Duane Shroufe, AZG&F

Senator John McCain, attn: John Raidt
Senator Dennis DeConcini, attn: Virginia Turner
Senator Bill Bradley, attn: Tom Jensen
Congressman George Miller, attn: Steve Lanich
Secretary of the Interior, Manual Lujan
Dennis Underwood, Commissioner, BOR
John Turner, Director, F&WS
John Ridenhour, Director, NPS
Rob Elliott, AZRA
Ed Norton, GCT
Martha Hahn, GCT
Dave Conrad, NWF
Rob Smith, Sierra Club
Gail Peters, American Rivers
Carm Mohle, Trout Unlimited
Dave Cohen, AZ Flycasters
Dave Wegner, GCES
Duncan Patton, ASU
Rick Gold, BOR

Comments on
GLEN CANYON DAM
INTERIM OPERATING CRITERIA
DRAFT ENVIRONMENTAL ASSESSMENT
by
GRAND CANYON RIVER GUIDES

Grand Canyon River Guides (GCRG) supports the Low Fluctuating Flow Alternative of the Glen Canyon Dam Interim Operating Criteria Draft Environmental Assessment.

We consider this alternative, however, to be a compromise in fulfilling the objective of protecting the sediment resources of Grand Canyon. The Glen Canyon Environmental Studies (GCES) have identified that fluctuating flows increase sediment erosion from the sand bars and beaches of the Colorado River. Given that knowledge it is apparent that an alternative with no fluctuations would provide the best protection for the the sediment resource. We also recognise the legitimate needs of power-users of Glen Canyon Dam (a group that includes a majority of our members) and wish to provide the utilities of the Colorado Plateau with as much flexibility as possible at the least cost while ensuring long-term protection for Grand Canyon. As an interim measure we support the proposed action of the draft Environmental Assessment with the following exceptions.

Low Fluctuating Flow Alternative, Chapter 2, page 1

- ◇ **GCRG suggests that "limit daily fluctuations " be changed to "limit fluctuations in any 24 hr. period"**
The purpose of interim flows is to moderate fluctuations and protect downstream resources. To that end a maximum daily fluctuation restriction is imposed. We suggest that there is some vagueness in whether that number represents a daily limitation or the limitation within any 24 hr period. We suggest that the limitation be defined as the maximum fluctuation in any 24 hour period in order to lessen confusion and provide the stated objective of downstream resource protection.

Operational Exception Criteria, Chapter 2, page 2

- ◇ **GCRG accepts and endorses the inclusion of exception criteria for emergency conditions and system regulation.**

- ◇ **GCRG does not support inclusion of financial exception criteria at this time.** We feel that there has been insufficient justification to risk further resource damage. We are sensitive to the position of those who purchase power but feel the best path is to not include the financial exception criteria until it can be proven that the need actually exists. The assumptions used by Western in justifying the economic need for this exception are controversial and should be substantiated before being included. If these assumptions are proven over time to be accurate we will reconsider our present position on the exception criteria.

White-water Boaters: Effects of the Financial Exception Criteria: Chapter 3, page 21

- ◆ **We strongly disagree with the conclusion that no measurable difference in the quality of white-water rafting will result from this exception criteria.**
 - ◇ It seems unreasonable that this exception will *never* be used should it be included in the interim flows. The fact that the river level *could* go from 20,000 cfs to 31,000 cfs at any time, no matter how remote the chance, effectively eliminates any camping on the sand bars which lie between those levels. This amounts to a large portion of the available recreational camping areas in the Canyon and cannot be considered inconsequential.
 - ◇ Any sudden, unexpected rise or fall in river level will cause an increase in stranded boats, flooded camps, equipment washed away, and a reduction in the quality of the visitor experience. Predictability of water levels is very important.
 - ◇ We would also like point out that the effects on recreational use in Grand Canyon go beyond the number of camp sites and the ease of negotiating the rapids. It is the river corridor as a whole that contributes to the quality of visitor experience and the recreational community is concerned with the health of all the downstream resources.

Monitoring Program, Chapter 2, page 3

- ◆
 - ◇ **The monitoring program must include a analysis and evaluation of the effects of interim flows on the economics of hydropower.** Such analysis is necessary to determine the need for future implementation of financial exception criteria.

LETTER 3



IN REPLY REFER TO:

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Affairs
600 Harrison Street, Suite 516
San Francisco, California 94107-1376



October 11, 1990

MEMORANDUM

TO: Roland Robison
Regional Director
Bureau of Reclamation
Salt Lake City, Utah

FROM: Patricia Sanderson Port
Regional Environmental Officer, San Francisco

SUBJECT: Comments on the Glen Canyon Dam Interim Operating
Criteria DEA

I appreciate the opportunity to review this EA. I note that two distinct exception criteria to interim flows are requested by the Western Area Power Administration. While I support exception criteria in the event of agreed-upon emergencies, I have questions about the environmental effects of WAPA's exercising exceptions for its own financial well being.

It is not clear what the threshold of financial levels is after which violations would be considered to occur. Does this hinge on the price of power? If so, what range of prices? The cooperators need to discuss and decide upon this threshold for financial exception criteria before they are implemented. In addition, I would suggest financial benefits accrued by using these exception criteria be identified each month and reported to the cooperators every 90 days. These benefits could be used to defer costs of monitoring.

In addition, there appear to be no financial penalties for patterns of violation of the interim flows. Should the cooperators agree to support some level of financial exception criteria, it is necessary and prudent to set in place financial deterrents to wilful violations of the interim flows.

I agree that a monitoring program is essential and applaud its inclusion in the EA as an Environmental Commitment (Appendix A).

I understand that the GCES staff will be coordinating the actual monitoring and reporting of the interim flows and the exercise of any GCES exception criteria. The GCES should be charged with reporting every 90 days to the cooperators the results of the flows on the environment and the financial impacts. This will allow for modifications of flows and of criteria as necessary by the cooperators based on impacts.

A mechanism needs to be established and agreed to by the cooperators to change the flows, the exception criteria, or both, as monitoring results are available.

I look forward to the final EA addressing these issues and documenting their resolution.

cc: Cooperators

Department of Water and Power  the City of Los Angeles

TOM BRADLEY
Mayor

Commission
MICHAEL J. GAGE, *President*
RICK J. CARUSO, *Vice President*
ANGEL M. ECHEVARRIA
DOROTHY GREEN
MARY D. NICHOLS
JUDITH K. DAVISON, *Secretary*

DANIEL W. WATERS, *General Manager and Chief Engineer*
ELDON A. COTTON, *Assistant General Manager - Power*
JAMES F. WICKSER, *Assistant General Manager - Water*
NORMAN L. BUEHRING, *Assistant General Manager - External Affairs*
NORMAN J. POWERS, *Chief Financial Officer*

October 11, 1991

The Honorable Manuel Lujan, Jr.
Secretary of the Interior
Interior Building, Room 6151
1849 C Street, N. W.
Washington, D. C. 20240

Dear Mr. Secretary:

**Glen Canyon Dam
Interim Controlled Colorado River Flows**

The Los Angeles Department of Water and Power (LADWP) has been tracking the progress of the Bureau of Reclamation's (Bureau) Glen Canyon Dam Environmental Impact Statement (EIS) and has submitted comments to the Bureau regarding the Colorado River flow alternatives to be considered in the Glen Canyon Dam EIS. Further, LADWP has concerns regarding the interim operating "test" flows that will be instituted by the Bureau, effective November 1, 1991, as outlined in the Draft Environmental Assessment (Low Fluctuating Flow Alternative). LADWP does not obtain power directly from the dam; however, LADWP is a member of a group of western utilities that are interconnected with the Western Area Power Administration. LADWP, therefore, would be impacted in the event of operation modifications to Glen Canyon Dam.

As stated in our comments to the Bureau, LADWP foresees that modification of the existing operation of Glen Canyon Dam will have impacts that need to be recognized and addressed in the EIS. In particular, changes in dam operation may result in the need to replace the reduced available on-peak hydroelectric power, the cleanest renewable power source produced, and in the need to find markets for the off-peak hydroelectricity which may be generated.

The chosen interim flows need to balance the potential benefits to the natural resources along the Colorado River with other adverse environmental as well as economic impacts to the hydroelectric power users. Also, some utilities would require a longer lead time to alter their electricity resource supply plans. The shift from the utilization of on-peak hydroelectric power to power produced by other means, such as the burning of fossil fuels, may result in additional or increased environmental impacts. Additionally, greater costs will be incurred in order

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E-13

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October 11, 1991

to make up for the reduced hydroelectric peaking capacity due to the changed dam operation.

The implementation of interim flows, not based on the completed analysis of the EIS, is disturbing. The changes in dam operations (Low Fluctuating Flow Alternative) may result in significant negative impacts which have not been identified in a completed EIS. LADWP is resistive to any changes in dam operations without a thorough investigation of the environmental factors involved and a complete analysis of the alternative solutions. At a minimum, LADWP would support interim flows only if no alternative environmental solutions were available and the Glen Canyon Dam Exception Criteria and Associated Interim Operating Procedure was used as outlined in the Interagency Agreement No. 91-SLC-0180 Draft dated October 2, 1991.

The LADWP appreciates the difficulty of the decision which must be made in this situation; however, we urge your careful consideration in establishing this interim flow, recognizing the potential impact to all users and resources.

Sincerely,



EDWARD KARAPETIAN
Manager of Environmental and
Governmental Affairs

c: Mr. Roland Robison
Regional Director, Upper Colorado Region
United States Department of the Interior
Bureau of Reclamation
P.O. Box 11568
Salt Lake City, Utah 84147



GAME & FISH DEPARTMENT

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Arthur Porter, Scottsdale

Director
Duane L. Shoups

Deputy Director
Thomas W. Spalding

October 11, 1991

Mr. Rick Gold
US Bureau of Reclamation
Upper Colorado Region
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Rick:

Re: Glen Canyon Dam Interim Operating Criteria, Draft
Environmental Assessment, Comments on September 1991 Draft

My staff has reviewed the Draft Environmental Assessment for Interim Operations at Glen Canyon Dam. We recognized that the time for development of the assessment was quite short because of the delays in arriving at a proposed action and that the information necessary for a most thorough review has not yet been finally compiled by the Glen Canyon Environmental Studies. Still, if Reclamation deems it necessary to prepare an Environmental Assessment for Interim Operations, then that assessment must be technically adequate and NEPA sufficient. The Department's comments will be divided into two components: the adequacy and sufficiency of the document will comprise General Comments included in the body of this letter, and specific suggestions for modification of the text of an editorial or technical nature will comprise Specific Comments included in an attachment to this letter.

GENERAL COMMENTS

Purpose and Need

It is apparent that the purpose of Interim Operating Criteria is to lessen impacts of dam releases upon downstream resources. Perhaps that purpose could be highlighted along with reference to the authority vested in the Secretary and the Commissioner for this undertaking. Highlighting this purpose would better justify the elimination of the Intermediate Fluctuating Flow and Sustained Fluctuating Flow alternatives in Chapter II.

Presentation of Alternatives

It was undoubtedly a difficult task to assemble this Environmental Assessment in the time allotted, and certainly the subject matter of the document is of a controversial enough nature to make presentation of the alternatives a delicate undertaking. Delicate or not, it must be clear to the public from this presentation what the Proposed Action really is. The presentation of that Proposed Action is rather unclear. The Proposed Action is actually subdivided into two subalternatives; Low Fluctuating Flows without Financial Exceptions and Low Fluctuating Flows with Financial Exceptions.

In the past month, the question of Financial Exception Criteria has been the subject of considerable debate. Before this draft is finalized and Reclamation moves to a decision document, the Proposed Action must be clarified to indicate which of the two subalternatives is, in fact, the Proposed Action. This document cannot be NEPA sufficient without specifying which course is proposed.

Comparison of Alternatives

Presenting a clear summary of impacts of a proposed action and alternatives to it is never easy. The table presented in Chapter II of the Environmental Assessment is well organized, however the use of the footnotes to clarify effects of the Proposed Action with and without Financial Exceptions leads to some confusion.

For example, footnote four (4) indicates slight adverse effects when Financial Exceptions are included in the Proposed Action. It is unclear if the slight adverse condition is in comparison to No Action or in comparison to the Proposed Action with out Financial Exceptions. I believe that the intention of the Authors was to compare the two subalternatives within the Proposed Action, but the reader could construe the footnotes to compare the subalternative to No Action. This led to some confusion and contradiction between the summary and information presented in Chapter III.

I suggest that you consider eliminating the footnotes and expand the table to compare both subalternatives to No Action.

Affected Environment

The Authors should be commended for including analysis assumptions in their discussion of the Affected Environment and Environmental Consequences. These helped us understand

the thought processes involved in assessing effects. It is important that these assumptions are clearly stated. The first and last of these assumptions were rather unclear and could be clarified for the readers benefit.

The last of these assumptions, linking biological and physical resources through sediment as a key parameter, is a good observation. It should not be construed, however, to suggest that sediment is the only key parameter, at least for aquatic resources. Temperature, hydrology, and the spread of non-native fishes are also important parameters.

There is a suggestion in the discussion of the recreational resources that the Lee's Ferry trout fishery is a resource in decline. In particular, the Authors cite the fact that angler use had declined from 52,000 angler days in 1983 to only 15,000 angler days in 1985. This was in fact the case, however, angler use has rebounded considerably since 1986. National Park Service and Arizona Game and Fish Department figures indicated angler use on the incline from 1987 through 1990.

YEAR	ANGLER USE DAYS
1987	25,600
1988	30,700
1989	32,500
1990	38,800

Consultation and Coordination

The Bureau of Reclamation has a special relationship with the Governors of the Basin States with respect to water allocation and delivery. It is my understanding that consultation with the Governors' representatives has been suggested to Reclamation concerning the effects of Interim Operations. It would be appropriate to reflect that consultation and the results of that consultation in this section of the assessment.

Additional specific comments and suggestions are appended to this letter for use in revision of the Draft Environmental Assessment. Larry Riley, of my staff, is at your disposal as a resource person or for editorial assistance.

I hope that this review, along with the specific technical and editorial suggestions appended to this review, will be viewed a constructive and useful. The document is in need of some minor technical revision and clarification to achieve the level of NEPA sufficiency and technical adequacy that the Department, and I believe Reclamation, desires. We have prepared this review rather hastily, given the short time allotted, and we may find that there

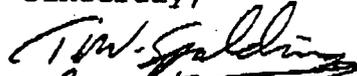
Mr. Rick Gold

4

October 11, 1991

are other constructive suggestions necessary. I will certainly pass those along to you at our Cooperators meeting next week.

Sincerely,



~~D.L. Shroufe~~
Duane L. Shroufe
Director

DLS:LR:lr

cc: Cooperating Agencies

attachment

SPECIFIC COMMENTS

Page Para

- I-4 2 This discussion of Phase I of the Environmental Studies does not set the reason for bridging into Phase II. Perhaps that could be underscored by ending the paragraph with a sentence similar to the following.
- "Because of hydrologic and climatic conditions, Phase I could not evaluate the effects of low and fluctuating flows."
- I-4 3 The discussion of Phase II could be considered inaccurate. Certainly, Phase II has been changed to accommodate the EIS schedule, but development of a second phase was initiated prior to decision to pursue an EIS and the studies were not developed to answer questions specifically spurred by scoping for the EIS.
- I-4 4 The second sentence in this paragraph refers to "terms". This was a little confusing, and changing that to "terms of contracts" might clarify.
- II-1 2 The discussion of the reasons for monthly and annual releases under No Action was very good. I thought, though, it might improve the sentence to include "meeting annual downstream Compact delivery commitments" to the list.
- II-2 3 In the second sentence, the word "certain" could be deleted.
- II-2 6 In the first sentence, the words "having the" could be deleted.
- II-3 In bullet 6, we may want to clarify that monitoring will be directed at both the criteria and adherence to the criteria and at the downstream effects of the criteria.
- II-6 Table 3 was rather confusing. I think the layout is good but the footnotes were confusing. Footnote 4 was cited in the comment letter as particularly confusing. It was unclear if "adverse" in footnote 4 was adverse compared to No Action (I don't believe that was the intent) or adverse compared to the Proposed Action without financial exceptions. I think it would be worth redrafting the table, eliminating the footnotes, and adding a fourth column to display the two subalternatives.

You also indicated that there would be no effect upon Threatened and Endangered Fish under the Proposed Action.

Page Para

- I think you might justify some improvement for backwater conditions and thus improved rearing habitat for chub.
- III-1 Bullet 1 of the assumptions was rather unclear. I believe that you are suggesting that No Action means that trends already noted under pre-1990 conditions would continue, and that analysis because of the short duration of interim operations would center on short term effects. I am not sure how to clarify the statement, but it does need some work.
- III-1 Bullet 6 of the assumptions is basically accurate, but only partly true when you consider aquatic resources. Researchers have indicated that thermal regime, the absence of spring flushing flows, and the spread of non-native fishes are as key as the distribution of sediment. The first two of these parameters are relatively unaffected by the proposed action (except perhaps with respect to differential warming of backwaters). It is argued, however, that stabilizing discharge will enhance conditions for the spread of non-native fishes, and thus indirectly the proposed action may affect native fishes. It has further been suggested that, if interim operations resulted in the loss of several year classes of native fish species, impacts could increase substantially. It is unclear at this time how interim operations over a short period (3 years) would result in year class failures unless there were:
- a) dramatic and immediate increases in non-native population levels
 - b) flow related losses of spawning and rearing habitat. (loss of spawning habitat could be incurred if access to tributary mouths was precluded/loss of rearing habitat could be incurred if backwater habitats were lost, inaccessible, or became inhospitable due to competition with or predation by non-natives)
- III-8 1 We state that "Sand that has aggraded in the channel pools and eddies may be available to rebuild beaches and sand bars during periods of high release" is good, but we should probably go on to reinforce our belief that no such releases will be made during interim operations.
- III-8 3 We mentioned operations during August of 1991, but I think they changed beginning in September. We should probably update with a sentence about operations in

Page Para

September and early October.

We mention reducing the "potential for bank erosion", when perhaps we may mean bank failure. This is a minor point and perhaps I misunderstood the concept being expressed.

- III-12 3 This paragraph ends with a sentence about rapid down-ramping and high flows. The sentence is awkwardly constructed, and could be clarified by removing "or while" and replacing with "and".
- III-13 3 This paragraph on effects of financial exceptions and trout needs a little work. Financial exceptions, as I understand them, will effect up-ramps and highs rather than the low end of the spectrum. It could result in stranding of fish, but probably won't dewater redds or habitat for trout fry established at or below the minimum flow level.
- III-14 5 This paragraph on effects on bald eagle is pretty complete. One concept that may need to be worked in has to do with the accessibility of Nankoweap Creek to trout. If trout cannot ascend the mouth of the creek and potentially become stranded, they are less available to eagles. It is valuable to know if peak flows will be sufficient for trout to ascent Nankoweap.

Trout and native fish access to the mouths of tributaries at peak flows is important for the fish themselves as well as predators that may take advantage of them.

- III-18 8 This was noted in the text of the letter. The implication is that the recreational fishery is in decline. The popularity of the fishery (at least as expressed through visitation) reached a minimum in 1986, but has rebounded to the point where visitation is approaching 40,000 angler days in 1990.

Angler days are a result of angler desire or expectation, introduction of new regulation, angler access, resistance to license purchase, economic conditions, and travel cost. Any or all of those may have been in effect.

- III-23 4 In the closing sentence of this paragraph, I think we are talking about "...funding of replacement power purchases...".
- III-25 In discussing the effects seen to date, I think we need to be careful. Our experience has been short.



LETTER 6



Department of Energy

Western Area Power Administration
P.O. Box 11606
Salt Lake City, UT 84147-0606

Mr. Roland Robison
Regional Director
Bureau of Reclamation
Upper Colorado Region
P.O. Box 11568
Salt Lake City, UT 84147

Dear Mr. Robison:

Western Area Power Administration (Western) appreciates the opportunity to review and comment on the "Glen Canyon Dam Interim Operating Criteria--Environmental Assessment." Our comments follow:

General Comments

1. The conceptual approach toward the establishment of interim operating criteria and the discussion embodied within the environmental assessment (EA) focuses wholly upon the mitigation of impacts through changes in dam operations. Entirely lacking is a discussion of other management alternatives which would produce similar mitigation of impacts without the radical changes to dam operations and the attendant significant impacts to power generation. Given that a multiagency forum is participating in the Glen Canyon Dam Environmental Impact Statement (GCD-EIS), it would behoove each of those agencies to present alternative mitigation measures for each of their respective resources with an eye toward sharing the responsibility of preserving both the Grand Canyon and the other participating agencies' resources, to the extent possible, rather than forcing one single agency to shoulder all of the burden of modified operational impacts.
2. The analysis presented within the EA addresses a mix of impacts resulting from the construction of Glen Canyon Dam as well as the operations of the powerplant. These impacts need to be carefully sorted and defined so that appropriate analysis of these impacts may then be conducted.
3. According to the Department of Interior's (DOI) procedures for implementing the National Environmental Policy Act (NEPA), an EIS should have been prepared. DOI's procedures state "[d]ecisions/actions which would normally require the preparation of an EIS will be identified in the Bureau Appendix to Chapter 6," see 45 Fed. Reg. 27,541, 27,545 (1980). The Bureau Appendix, found at 516 DM 6, Appendix 9 (1983), states in paragraph 9.3, "[t]he following types of BuRec proposals will normally require the preparation of an EIS: . . . (4) Proposed modifications to existing projects or proposed changes in the programmed operation of an existing project that may cause a significant new impact"

The EA attempts to gloss over this problem by astutely avoiding any statement that the proposed changes in flows will have any significant impacts and by omitting a discussion of the impact of the new flow regime on power operations. The new flow regime translates into a loss of generation

at Glen Canyon Powerplant in excess of 400 megawatts (MW) of power. The generating capability of the powerplant at the previously existing maximum water release of 31,500 cubic feet per second (cfs) was 1,323 MW. Under the interim-flow regime, the maximum release is limited to 20,000 cfs, which reduces the generating capability to 840 MW. This is a significant change from the status quo, which triggers the requirement to prepare an EIS. See, for example, Burbank Anti-Noise Group v. Goldschmidt, 623 F.2d 115 (9th Cir. 1980); County of Trinity v. Andrus, 438 F. Supp. 1368, 1388 (E.D.Cal. 1977); Upper Snake River v. Hodel, 921 F.2d 232 (9th Cir. 1990); and Andrus v. Sierra Club, 442 U.S. 347 (1979).

In County of Trinity and Upper Snake River, the courts found that no EIS was required because the agency had not proposed any change in the status quo. The dams in each of those cases were being operated the same way they had been [operated] previously under drought conditions. The court noted in Upper Snake River, quoting County of Trinity:

The Bureau has neither enlarged its capacity to divert water from the Trinity River nor revised its procedures or standards for releases into the Trinity River and the drawdown of reservoirs.

See Upper Snake River, 921 F.2d at 235, quoting County of Trinity, 438 F. Supp. at 1388-1389.

Here, however, the Bureau [Reclamation] is proposing to revise, in fact has revised, its procedures and standards for releases into the Colorado River below Glen Canyon Dam. In Andrus v. Sierra Club, 442 U.S. 347, 363, the Supreme Court stated that if an ongoing agency program or activity is "expanded or revised in a manner that constitutes a major federal action significantly affecting the quality of the human environment," an EIS must be prepared. "[M]ajor Federal actions' include the expansion or revision of ongoing programs," Id., n.21.

The EA appears to attempt to circumvent this problem by suggesting that the changes in operations will not have significant impacts upon the environment. If this is true, then the proposed changes clearly violate Section 7 of the Colorado River Storage Project (CRSP) Act, 43 U.S.C. §620f, and §§303(b), 601(a), 601(c) and 602(c) of the Colorado River Basin Project Act, 43 U.S.C. §§1523(b), 1551(a) and (c), and 1552(c), which repeatedly state that the CRSP powerplants, which include the Glen Canyon Powerplant, "shall be operated in conjunction with other Federal powerplants, present and potential, so as to produce the greatest practicable amount of power and energy that can be sold at firm power and energy rates."¹ Arbitrary changes in operations that substantially reduce

¹ See also Arizona Power Authority v. Morton, 549 F.2d 1231, 1251 (9th Cir. 1977); Salt Lake City v. Western Area Power Administration, 926 F.2d 974, 980 (10th Cir. 1991).

the amount of firm power and energy that can be sold, as dictated by the interim-flow regime, clearly violate these laws.

4. Finally, adoption of interim releases without an environmental impact statement is in direct contravention of §1506.1(c) of Council on Environmental Quality (CEQ) regulations:

(c) While work on a required program environmental impact statement is in progress and the action is not covered by an existing program statement, agencies shall not undertake in the interim any major Federal action covered by the program which may significantly affect the quality of the human environment unless such action:

- (1) Is justified independently of the program;
- (2) Is itself accompanied by an adequate environmental impact statement; and
- (3) Will not prejudice the ultimate decision on the program. Interim action prejudices the ultimate decision on the program when it tends to determine subsequent development or limit alternatives. (Emphasis supplied).

Specific Comments

As is indicated in following comments, there is virtually no quantification of impacts (positive or negative) on any resource, with the possible exception of power. It is impossible for reviewers to make an intelligent assessment of the tradeoffs among the different alternatives.

1. Page I-1: The introduction section fails to cite CEQ regulations as a source for requiring the EA to be prepared.
2. Page I-3 (second paragraph): We recommend that a footnote be drafted and appended to the discussion of the "Western" alternative. The footnote should state:

Due to the court order in the lawsuit, National Wildlife Federation, et al. v. Western Area Power Administration, et al., prohibiting Western from recommending alternative releases from Glen Canyon Dam to Reclamation, Western did not submit a recommendation or alternative per se. Rather, Western offered a concept of a different release regime with no recommendation as to its adoption.

3. Page I-4: Under "Glen Canyon Dam EIS," the sentence beginning "The EIS will discuss" does not make sense. The EIS will not reduce adverse impacts.
4. Page I-4: Under "Western's EIS," the correct title for Western's EIS is the "Salt Lake City Area Integrated Projects (SLCA/IP) Electric Power Marketing EIS." The purpose of Western's EIS is to assess the impacts of alternative

marketing criteria and programs on powerplant operations and upon the natural and human environment.

5. Page II-1, under "No Action," first sentence: Annual releases also are a function of forecast error. In the second paragraph, statements about average monthly releases appear to only reflect dry-year conditions. In the third paragraph, we are not aware of any requirement that daytime recreation flows had to be a minimum of 8,000 cfs. Fourth paragraph, is the 5,000-cfs ramping rate correct and applicable to both up and down ramps?
6. Page II-1, second paragraph under "LFFA": The statement, "Flows could be fluctuated up to 20,000 cfs," could easily be confused with the maximum daily fluctuation limits.
7. Page II-2, first paragraph: The statement, "The duration of 5,000-cfs flows would be limited to 6 hours," appears nowhere in the Commissioner's press release or justification statement, nor anywhere else that we are aware of, nor is it compatible with the minimum release schedule for night time.
8. Page II-3 (fourth bullet): Add the words "of financial exception criteria."
9. Page II-6: We have not had sufficient time for detailed analysis; however, this table needs to be reviewed carefully to see if supporting text or other documentation sufficiently validates conclusions. As noted from some of our other comments, it is apparent that the environmental impacts are incorrectly stated especially for low-fluctuating flows.
10. Page III-5, last paragraph: Does this put to rest the myth of the "13-foot wall of water"? Perhaps it would be appropriate to so state?
11. Pages III-5/6/7: There is no quantitative information as to the rate or degree of erosion taking place. The reader cannot ascertain whether beaches are eroding at 1 percent/year or 50 percent/year.
12. Page III-8: Under the discussion of the low-fluctuating flow alternative consequences, there is no quantification of erosion. The reader has no idea of the erosive potential of the "no-action" alternative and the low-fluctuating flow alternative. It is inferred that the erosion is tremendous and due only to dam operations.
13. Pages III-8 (last paragraph) and III-9 (first partial paragraph): Statements regarding spills and their benefits are apparently based upon supposition. We are unaware of any supporting data or studies.
14. Page III-10: Low-fluctuating flow alternative consequences suggest that vegetation will increase as a result of the changed flow regime although the change will mean that the zone from 20,000 to 31,500 cfs will no longer be watered on a regular basis, while the zone up to 20,000 cfs has been and will continue to be watered regularly under both the no-action and changed flow alternatives. These types of speculative comments unsupported by scientific evidence cause one to question the credibility of the EA itself.

15. Page III-14: The discussion of possible effects of changing the operation of Glen Canyon Dam also lacks scientific bases for its conclusions and scientific integrity. For example, it notes that under present conditions, an endangered species--the bald eagle--has recently come to the Grand Canyon. "Eagles first appeared [at Nankoweap Creek] in the winter of 1985-1986 (four birds) and have increased to a high of 26 birds in a single day in the winter of 1989-1990 . . . it appears the number of eagles at Nankoweap Creek may be related to the abundance of spawning trout," see III-14. The EA includes a letter dated September 25, 1991, from the U.S. Fish and Wildlife Service (FWS) which suggests, at page 8, that the eagles came to Nankoweap Creek because, under the existing flows, the spawning trout were stranded at Nankoweap Creek. The FWS report and the draft EA gloss over the fact that the interim-flow regime will result in fewer trout being stranded at Nankoweap Creek and ignore the resulting impact on the eagles.
16. Page III-11, last full paragraph: The insinuation here that a post-flood equilibrium would someday be attained disregards the fact that future floods will fully modify the canyon habitat causing a renewed post-flood condition, and this condition will repeat itself indefinitely.
- Additionally, this section should be concerned with impacts to backwater habitats as a result of low fluctuations. Those backwaters exist because of the current fluctuations, and without those fluctuations, the sediment bars creating the backwaters may begin to slough while the backwaters will immediately begin to fill with vegetation.
17. Pages III-18-21: Although improved safety is cited in Table 3 as a benefit of the low-fluctuating flow alternative, there is virtually no discussion of safety issues in this text.
18. Page III-24 (first full paragraph): The 0.3-percent figure appears to have been extracted from sources unfamiliar with the true impacts of changed operations. Western has not completed its full analysis of impacts from a rate increase resulting from the interim operating criteria. We believe that the 0.3-percent figure is, however, a serious understatement of the true impacts of the interim operating criteria to Western's customers.
19. Page III-11: Financial Exception Criteria--This paragraph should be restated as follows:

Financial Exception Criteria would permit temporary deviations from interim operating criteria (not to exceed 3 percent of the time) in order to permit Western to demonstrate the availability of Glen Canyon Dam's generating capacity for meeting pooled utility obligations. Under this procedure, capacity at Glen Canyon Powerplant--idled as a result of interim operating criteria--would be available to Western up to 22 hours monthly so as to establish the availability of that capacity for meeting firm and emergency load requirements. It is intended that financial exception criteria reduce the probability of having to purchase

firm capacity. Savings to Western may be as much as \$19 million as compared to the low-fluctuating flow alternative.

20. Pages III-24/25: Since power system impacts and costs are not mentioned, this EA is deficient in addressing all of the potential impacts of the proposed interim operating criteria.

If there are any questions on these comments, please telephone me at FTS 588-6372 or Dave Sabo at FTS 588-5392.

Sincerely,



for Lloyd Greiner
Area Manager



CREDA

COLORADO RIVER ENERGY DISTRIBUTORS ASSOCIATION

October 15, 1991

ARIZONA

- Arizona Municipal Power Users Association
- Arizona Power Authority
- Arizona Power Pooling Association
- Irrigation and Electrical Districts Association
- Navajo Tribal Utility Authority (also New Mexico, Utah)
- Salt River Project

Mr. Roland Robison
 Regional Director
 Bureau of Reclamation
 P.O. Box 11568
 Salt Lake City, Utah 84147

Dear Mr. Robison:

Thank you for furnishing CREDA the opportunity to review and comment on the Draft Environmental Assessment on the Glen Canyon Dam Interim Operating Criteria. Recognizing the extremely short timeframe allowed for its preparation, we find the document, except for one major shortfall, generally adequate for the purpose intended. We are preparing a detailed response covering concerns we have about shortcuts that must not be repeated in the Glen Canyon Dam EIS. We will limit our specific comments here to a major shortfall in the EA that concerns the analysis of economic and related socioeconomic impacts. The purpose of this letter is to point out that error in the EA as now drafted which, if not corrected, will call the whole EA and your planned Finding of No Significant Impact into question.

The discussion of economic and financial impacts on pages III-23, 24 is seriously flawed, misleading and inadequate. First, the inclusion of national economic impacts is not relative to this EA or EIS process. The CEQ regulation specifically requires an analysis of an action in terms of its effects on specific localities and interests. Our August 20, 1991 letter to the Commissioner, copy to you, states our view of this requirement very clearly.

Second, your brief discussion of financial impacts is inadequate in the extreme. Based on the very little data which you have bothered to gather to date, the EA writers accumulate and average impacts to the point where they conclude that a \$22 million additional cost for replacement power is virtually nil. The EA must articulate the impacts in more detail. One cannot reach valid conclusions by lumping all CRSP customers into a large averaging process.

Starting at Glen Canyon Dam itself we find a significant financial impact. In an 8.23 maf, year

COLORADO

- City of Colorado Springs
- Platte River Power Authority
- Tri-State Generation & Transmission Cooperative (also Nebraska, Wyoming)

NEVADA

- Colorado River Commission of Nevada
- Silver State Power Association

NEW MEXICO

- Farmington Electric Utility System
- Plains Electric Generation & Transmission Cooperative (also Arizona)
- City of Truth or Consequences

UTAH

- Intermountain Consumer Power Association (also Arizona, Nevada)
- City of Provo
- Strawberry Electric Service District
- Utah Municipal Power Agency

WYOMING

- Wyoming Municipal Power Agency

CLIFFORD BARRETT

Executive Director
 City Centre 1, Suite 1000
 175 East 400 South
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 Phone 801-350-9090
 Fax 801-350-9051

Mr. Roland Robison
October 15, 1991
Page 2

Glen Canyon will generate about \$55 million in revenue at current rates. The interim criteria will cause Western to purchase replacement power which, without exception criteria, is estimated to cost \$22 million. Western's customers will now be paying \$77 million for the same product which before August 1, cost only \$55 million. This represents a 40% increase in the cost of power from this resource that the customers must pay. That is a significant financial or economic impact.

The EA is correct in stating that all customers blend the CRSP resource with other sources of power and therefore the impact on ratepayers is smaller. But, the EA makes a gross accumulation of these impacts and concludes that the average impact is only 0.3 percent. In making such an analysis, it is imperative that the wide disparity between customers be recognized. It is true that customers such as Salt River Project that have their own generation, and depend on CRSP for a very small portion of their supply, will realize a very small increase due to Interim Criteria. However, there are only a few customers in this position. The vast majority of customers do not have generation, and rely on CRSP for a much larger portion of their demand. Their increase costs, which are passed directly to the consumer are much larger. For example, in Utah, after blending with other sources, Bountiful costs will increase 14.69%, Morgan 13.8%, Dixie-Escalante 11.361%, Ephraim 10.00%, etc, etc. These percentages are representative of a large number of CRSP customers. They indicate that implementing the interim operational criteria without exception criteria will have significant economic and social impacts to those communities.

In discussing economic impacts, the Draft EA correctly states that conclusive data are not yet available. One major reason that your EA is so inadequate in this area is the complete lack of effort on the Bureau's part to get the economic data needed for such analysis. We draw your attention to our September 27 letter to you on this subject and request it be made a part of the record in this EA review process.

As an aid in correcting the immediate situation in the EA, we suggest the enclosed change for the section titled Financial (Marketing) Impacts.

Thank you for the opportunity to contribute to correcting the analysis in the EA.

Sincerely,


Clifford Barrett
Executive Director

Enclosures

Western offers short-term firm power sales, which are for a season or on a month-by-month basis when power available exceeds the demand. Nonfirm energy sales typically are for durations ranging from a month to several hours and follow market prices for various energy sources. Western offers firm transmission service, reserved capacity over the CRSP system, and nonfirm transmission service which, like nonfirm power sales, is interruptible on short notice.

LOW FLUCTUATING FLOW ALTERNATIVE CONSEQUENCES

Economic Impacts

From a national economic perspective, the economic impacts of the Low Fluctuating Flow Alternative are measured by the difference in production cost to the overall Pacific Southwest region electric power system compared to the No Action Alternative. Such studies are done using production expansion models which develop the lowest production costs given a range of possible power resources. Studies are currently underway to address this issue for the GCDEIS as part of the GCES II Research Program. Conclusive data are not yet available; however, in the short-term covering the 3-year period of the interim flows, it is likely that some excess capacity exists in the system. If so, this capacity, which is likely thermal plants, could be used. There would be increased fuel and operating costs. Glen Canyon Powerplant would shift to a more baseload operation and would substitute for some existing thermal plants. There may be additional costs of using surplus thermal capacity for peaking if the equipment is not designed as a peaking facility. However, in the short run, the net effect on the cost of power from the overall system is estimated to be a relatively minor increase.

Financial Exception Criteria Option.—There would be no significant difference in the economic cost of generating power in the regional electric power system compared to the Low Fluctuating Flow Alternative.

Financial (Marketing) Impacts

The consequences of the Low Fluctuating Flow Alternative in the near future would involve impacts to Western and, ~~to the extent that Western passes its costs on,~~ to Western's customers in terms of service and the financial cost and funding of replacement power as a result of interim operating criteria. Western has initiated a process that will raise rates on December 1, 1991 to cover these increased costs. A shift in generation from on-peak to off-peak periods in most months would be anticipated. Assuming a fixed monthly amount of water, the change corresponds to off-peak water releases displacing water from on-peak to off-peak periods, leaving less water available on a daily basis for on-peak electric load generation; this, in turn, would require more on-peak purchases.

Under the interim flow regime, Western could not meet its firm load obligation with Federal hydropower, and projects a change in the timing, magnitude, and expense of projected purchases required to satisfy those firm contractual commitments. ~~If Western cannot modify its contracts,~~ Western's estimate of cost to purchase

replacement energy and capacity is \$22 million in FY 1992. These added costs to the Federal Government would have to be covered by increased costs to Western's customers.

INSERT "A"

The \$22 million in added costs would be blended with the existing rate structure to Western's customers. The customers would, in turn, blend the rate increase with their other sources of power and energy. Detailed data on the effect on Western's customers are not available. ~~Depending upon the customers' reliance on Western Power as a resource, financial impacts could range from negligible to significant. It has been estimated that the average increase to the final consumer could be less than .3 percent.~~

INSERT "B"

Nonfirm sales could be adversely affected by a shift of releases from on-peak to off-peak periods. Additionally, ramping rates and the maximum daily change would restrict Western's ability to respond to power system demands.

Financial Exception Criteria Option.—Financial exception criteria would permit temporary violations of the flow criteria (not to exceed 3 percent of the time) to permit Western to meet its pooled utility obligations to provide system capacity when called upon. Under this procedure, capacity at Glen Canyon Powerplant idled as a result of interim flow criteria would be available to Western 22 hours per month as a means of avoiding the expense of purchasing replacement firm capacity and energy. It is estimated that by having the ability to purchase nonfirm power Western's costs would be \$3 million; thus, Western would save \$19 million as compared to the Low Fluctuating Flow Alternative.

CUMULATIVE IMPACTS

Due to the short-term nature of the proposed action, and the fact that any actions outside those described in the proposed action are unlikely, any cumulative impacts are expected to be minimal and of short duration.

PRELIMINARY FINDINGS OF TEST FLOW IMPACTS

FINDINGS BY RESOURCE CATEGORY

Testing of proposed interim operating criteria was instituted on August 1, 1991. It is the objective of this discussion to *qualitatively* address the effects of this test on the natural and recreation resources in the Grand Canyon. Only a qualitative, not quantitative, assessment is possible due to the very limited time for ecosystem response and limited GCES scientific effort that has gone into determining the impacts of the test. Ecosystem responses and biological processes take longer to manifest themselves than a month.

The effects of the test flows are outlined by category.

INSERT "A"

In an 8.23 maf year, Glen Canyon will generate about \$55 million in revenue at current rates. The interim criteria will cause Western to purchase replacement power which, without exception criteria, is estimated to cost \$22 million. Western's customers will now be paying \$77 million for the same product which before August 1, cost only \$55 million. This represents a 40% increase in the cost of power from this resource that the customers must pay. That is a significant financial and economic impact.

INSERT "B"

The financial impact on the final consumer depends to a large extent on what portion of the customer's need is met by Western. This degree of dependence on CRSP power ranges from less than 5% to over 70%. The great majority of customers rely on Western to meet 35% - 50% of their demand. The financial impact to the consumer also depends on what prices the customer pays for its other sources of power. Generally, those that own generation have lower costs than those that purchase from other suppliers. It is impossible to aggregate all these variable impacts and arrive at a single estimate of impact across the system.

A sample of customers shows the following increases in costs to power consumers:

Bountiful, Utah	+ 14.690%
Morgan, Utah	+ 13.800%
Dixie-Escalante, Utah	+ 11.361%
Ephraim, Utah	+ 10.000%
Platte River Power Authority, CO	+ 5.900%

These are typical of the majority of the CRSP customers, most of which are in rural areas. These increases are major changes having significant economic and social impacts over a large area of the 6 states served by CRSP power.



LETTER 7A



CREDA

COLORADO RIVER ENERGY DISTRIBUTORS ASSOCIATION

August 20, 1991

ARIZONA

Arizona Municipal Power
Users Association

Arizona Power Authority

Arizona Power Pooling Association
Irrigation and Electrical
Districts Association

Navajo Tribal Utility Authority
(also New Mexico, Utah)

Salt River Project

Commissioner Dennis Underwood
Bureau of Reclamation
Department of the Interior
Washington D.C. 20240

Dear Commissioner Underwood:

We are informed that the Salt Lake City office of the Bureau and Western Area Power Administration have reached agreement on interim operating procedures for Glen Canyon Dam, which the Bureau will distribute to the cooperating agencies for comment. The agreement reached establishes two very important principles. First, it allows for departure from the interim criteria to maintain system reliability and integrity in emergency situations. Second, it allows Western to demonstrate to its power suppliers that this capability is maintained, and thus has the potential for greatly reducing the costs of replacement power purchases.

We believe that adoption of this agreement for the interim flow test period will demonstrate that there are substantial benefits without any significant reduction in your environmental goals. This test will then support continuation of the exception criteria for the entire interim flow period. We urge you to adopt this agreement as now drafted, as soon as possible.

We also encourage you to consider the fact that the exception criteria may reduce financial impacts of the interim flows significantly, and by reducing these impacts make timely NEPA compliance on interim flows much easier to achieve.

We note that you have received a letter dated August 9, 1991, from several environmental groups on this issue and want you to know that we do not object to their being given an opportunity to see and comment on the proposed operating procedures. However, we do object strenuously to the assertion that economics should be given no consideration. We don't believe that Glen Canyon should be operated solely for power production; but on the other hand, we see no justification for not taking steps to greatly reduce the costs if it can be done without compromising environmental objectives.

We have received a copy of the August 12, 1991 letter to you from the Environmental Defense Fund discussing their view of the economic impacts. In that letter, EDF asserts that the appropriate economic impacts for consideration are those to society as a whole, and point out that while there may be high costs to CRSP

ARIZONA
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Arizona Power Authority
Arizona Power Pooling Association
Irrigation and Electrical
Districts Association
Navajo Tribal Utility Authority
(also New Mexico, Utah)
Salt River Project

COLORADO

City of Colorado Springs
Platte River Power Authority
Tri-State Generation &
Transmission Cooperative
(also Nebraska, Wyoming)

NEVADA

Colorado River Commission
of Nevada
Silver State Power Association

NEW MEXICO

Farmington Electric Utility System
Plains Electric Generation &
Transmission Cooperative
(also Arizona)
City of Truth or Consequences

UTAH

Intermountain Consumer Power
Association (also Arizona, Nevada)
City of Provo
Crawberry Electric Service District
Utah Municipal Power Agency

WYOMING

Wyoming Municipal Power Agency

CLIFFORD BARRETT

Executive Director
City Centre 1, Suite 1000
75 East 400 South
Salt Lake City, Utah 84111
Phone 801-350-9090
Fax 801-350-9051

power customers, these are offset by income to power producers; and thus the net costs to society are minimal. This may be true, but the purpose of an EIS is to analyze specific impacts that may result from a federal action.

If economic impacts are to be aggregated and therefore become nil, it is logical that all impacts to natural and recreational values should also be aggregated. In that case, all the various impacts of Glen Canyon Dam operations also could be aggregated. The likely result of such a study would be a demonstration that the present operation produces more benefits than harm and thus should remain as is. For example, it could show that as some beaches are degrading others are improving and that the total sediment in the system is nearly constant or gaining. In the aggregate the beach problem is then greatly reduced. We cannot accept the assertion of EDF unless, of course, you are willing to apply it to the entire range and scope of Glen Canyon Dam impacts, positive and negative, on a regional basis.

In addition, we find EDF's argument somewhat at odds with what CEQ requires from a NEPA standpoint. The CEQ regulation on compliance with NEPA discounts strict cost-benefit analysis and treats it as supplementary information for decision making (40 CFR 1502.23). On the other hand, the CEQ definition of the term "significantly" (as used in the content of actions "significantly affecting the human environment" (40 CFR 1508.27)), expressly requires the analysis of an action in terms of its effects on society, regions, specific interests and localities. We believe that it is entirely inappropriate to ignore the gains and losses of various interest groups in a decision of this magnitude, particularly when most of the benefits will accrue to commercial recreational interests and most of the cost will be borne by power users.

We look forward to working with the Bureau and Western to solve these important issues.

Sincerely yours,


Clifford Barrett
Executive Director

jca

cc: Secretary of the Interior, Manuel Lujan
Regional Director, Roland Robison



CREDA

COLORADO RIVER ENERGY DISTRIBUTORS ASSOCIATION

September 27, 1991

ARIZONA
Arizona Municipal Power
Users Association
Arizona Power Authority
Arizona Power Pooling Association
Irrigation and Electrical
Districts Association
Navajo Tribal Utility Authority
(also New Mexico, Utah)
Salt River Project

Mr. Roland Robison
Regional Director
Bureau of Reclamation
P.O. Box 11568
Salt Lake City, UT 84147

Dear Roland:

COLORADO
City of Colorado Springs
Platte River Power Authority
Tri-State Generation &
Transmission Cooperative
(also Nebraska, Wyoming)

We are very concerned about the significant lack of progress being made on the power economic studies portion of the Glen Canyon Environmental Studies and Glen Canyon Environmental Impact Statement. During GCES Phase I, the power economics were ignored until the very last minute and, when WAPA was finally invited to participate, their input was for the most part ignored. That resulted in direction from the Secretary of the Interior to conduct the GCES Phase II studies specifically to include power economics. The Power Resources Committee was created to study power economics and included representatives from WAPA, the Bureau of Reclamation, as well as the power community (CREDA) and the environmental community (EDF). This group worked diligently trying to develop a methodology to address the variety of alternatives anticipated in the EIS process. This group has had its difficulties, but was able to make substantial progress in reaching consensus on how the study should be conducted.

NEVADA
Colorado River Commission
of Nevada
Silver State Power Association

NEW MEXICO
Farmington Electric Utility System
Plains Electric Generation &
Transmission Cooperative
(also Arizona)
City of Truth or Consequences

Over a year ago, the Power Resources Committee recommended to the Bureau of Reclamation that an independent contractor be hired to run both the EGEAS and ELFIN power system models. Notice had been given in the Commerce Business Daily and a review process including a TPIC had been developed to hire the consultant. Since that time, the Bureau of Reclamation has done nothing to implement that recommendation and to get a contractor "on board" to begin the studies. Therefore, a year has been wasted and the clock continues to run on the EIS process. It appears that the Bureau is trying to bring the GCES Phase II studies to an end without meeting one of its primary goals of studying power economics.

UTAH
Intermountain Consumer Power
Association (also Arizona, Nevada)
City of Provo
Strawberry Electric Service District
Utah Municipal Power Agency

WYOMING
Wyoming Municipal Power Agency

In the meantime, the Bureau of Reclamation has found a convenient way to facilitate the recreation and "existence value" economic studies through subcontracts of the HBRS contract. A subcontract for the power economics could have been included, but was conveniently ignored when the HBRS contract was put together. Now we understand that there are discussions about contracting with Argonne National Labs to "piggyback" on the WAPA EIS power economic studies. We are not sure whether this is a recognition that

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Mr. Roland Robison
Bureau of Reclamation

p. 2
September 27, 1991

the Bureau of Reclamation does not know how to conduct power economic studies, or another attempt to circumvent interested parties' participation. We think it is vitally important that the existing system be modeled appropriately and that the idiosyncracies of the Rocky Mountain Region Power System are properly represented. We think that our participation will significantly improve the credibility of these studies, and we are willing and able to put forth the effort needed to do so.

We therefore request an explanation of why the power economics contracts have been delayed and why the Bureau of Reclamation is not moving forward with the Power Resources Committee effort. What assurance can you give us that a credible power economics study will be completed before the conclusion of GCES Phase II studies and prior to drafting the EIS? We have continually asked for clarification through the Bureau of Reclamation, including asking Dave Wegner in March 1991, Rick Gold in May 1991, and again in July 1991, and have continued to get vague and unsatisfactory answers.

The GCES process was also to include the formation of an Economics Oversight Committee which included representatives from CREDA and EDF to oversee the coordination of the power, recreation, and "existence value" economic studies. This group has never met, and the organizational structure has been continually changed to limit the participation of interested parties. Therefore, we request that the Economics Oversight Committee be organized immediately and a meeting be called as soon as possible.

CREDA is very interested in supporting the Bureau on a comprehensive and credible study in the EIS process. However, we cannot support a process in which we are continually ignored and the process continually changed to circumvent an order by the Secretary of the Interior. I would be happy to discuss this matter further with you and look forward to your prompt response to our concerns.

Sincerely yours,


Clifford Barrett
Executive Director

jca

Wm. Kent Romney
General Manager

Page Electric Utility



19 Ninth Avenue ■ Post Office Box 1955 ■ Page, Arizona 86040
Fax: (602) 645-5322 Telephone: (602) 645-2419

October 17, 1991

Mr. Roland Robinson
Regional Director
U.S. Bureau of Reclamation
Upper Colorado Region
P.O. Box 11568
Salt Lake City, UT 84147

Dear Mr. Robinson:

Page Electric Utility appreciates the opportunity to comment on the "Glen Canyon Dam Interim Operating Criteria and Environmental Assessment".

It appears that the Bureau of Reclamation has caved in to the demands and requests of the recreation and downstream uses of the river. These uses are, of course, camouflaged as protecting the downstream beaches, vegetation, and river ecology.

Initiating interim flows is a major change in the way the river has been operated since the Dam was installed. Reducing the generating capacity of Glen Canyon Dam does have extremely significant financial impact to the area and to all who will suffer the cost of replacement power.

The environmental assessment attempts to whitewash these facts by stating that: proposed changes in flows will not have any significant financial impact on power operations.

The new Interim Flow Criteria translates into a loss of generation at Glen Canyon Power Plant in excess of 400 megawatts (MW) of power. The generating capability of the plant at the previously existing maximum water releases of 31,500 cubic feet per second (CFS) was 1,323 megawatts. Under Interim flows the maximum flow is limited to 20,000 CFS which reduces the generating capability to 840 MW. This is an extremely significant change from the status quo which should trigger the requirement to prepare a full blown EIS.



electric power service for the people . . . by the people

Mr. Roland Robinson
Page 2
October 17, 1991

The current EIS is not complete so interim flows should not be mandated until all EIS information has been studied. Those who have pressed the agencies to have interim flow in place September 1, 1991 are in violation of their own policy.

It seems evident that the power community has little or no support from those who should be looking out for our better interests. It's no secret that power users pay the bills, and we need some consideration and flexibility to mitigate the damages brought on by the loss of generation due to Interim Flows.

It would be so much easier to solve the problems of Glen Canyon Dam if we first develop the facilities that would replace the lost generation or have full support from all the agencies to install the regulation Dam below the Glen Canyon. This concept was part of the original Upper Colorado Project Plans. Political and environmental along with special interest have made it a non-popular option but it would give everyone what they want in the long run.

Since all these projects to replace lost capacity are a long way from ever being a reality, the current request to give Western the Financial Exception Criteria is a very important issue to Page Electric Utility.

Financial Exception Criteria will give Western the flexibility to maximize Glen Canyon Power Plant's generation capacity. Western has identified the benefits in their comments as: "permitting temporary deviations from interim operating criteria (not to exceed 3 percent of the time) in order to permit Western to demonstrate the availability of Glen Canyon Davis generating capacity for meeting pooled utility obligation. Under this procedure, capacity at Glen Canyon Power Plant (idled as a result of interim operating criteria) would be available to Western up to 22 hours monthly so as to establish the availability of that capacity for meeting firm and emergency load requirements. It is intended that Financial Exception Criteria reduce the probability of having to purchase firm capacity. Saving to Western may be as much as \$19 million as compared to the low fluctuating flow alternative".

The magnitude of the possible savings with the Exception Criteria is significant because no drastic change in flows will occur in order to establish the availability of capacity for meeting firm and emergency load requirements.

The environmental assessment does not address the impacts and cost to the power system that will occur due to the proposed Interim Operating Criteria. Several articles in our opinion overstate the

Mr. Roland Robinson
Page 3
October 17, 1991

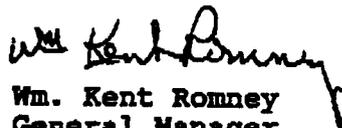
impacts to the environmental concerns but fails to correctly state the impacts to power production or in this case the loss of power production.

It brings us back to the controversial question, can we place a price on the environment? It has been my experience that when the lights go out everyone wants the lights back on first then work out the consequences for providing the electric power that allows them to have the choice to turn the switch on or off.

We appreciate the pressure you have placed on you from all the agencies you serve. Our interest, of course, is to maintain and preserve a fair, dependable, cost base resource, that is clean and renewable and does not take a second to recreational or reasonable environmental restraints.

Thank you for this opportunity to comment on this very important issue. We support the oral and written comments of CREDA, Western, ICPA, and those in favor of preserving the generating capacity of Glen Canyon Dam Power Plant.

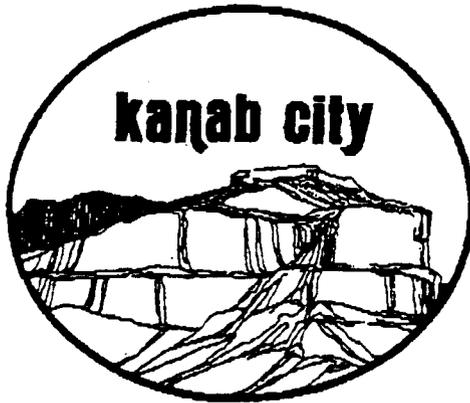
Sincerely,


Wm. Kent Romney
General Manager

WKR/dmr



LETTER 9



KANAB CITY
76 North Main #14
Kanab, Utah 84741
(801) 644-2534

Mayor
Bernie Ripper
City Manager
Keith L. McAllister
Treasurer
RaeLene Johnson

October 17, 1991

Mr. Roland Robison
Regional Director
Bureau of Reclamation
Upper Colorado Region
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Mr. Robison:

The City of Kanab would like to go on record as supporting a proposal to release water from the Glen Canyon Dam to exceed proposed releases 3 percent of the time. We would propose granting a maximum exception of 3 percent, limited to 22 hours a month.

In early 1980, Kanab City began to study the possibility of purchasing the local electric distribution system. It was felt the City could operate and maintain the system as well, if not better, than the owners at that time. One of the major factors involved in this decision was the fact that the Western Area Power Administration would be re-allocating its hydroelectric power in 1989. The blend of WAPA power and public market power would make Kanab Cities electric rates very attractive.

Kanab City was awarded a small allocation of WAPA power and a difficult decision was made to purchase the local system. Soon after the City entered the electric utility business, WAPA was forced, by a move from the environmental front, to reassess its allocations of power. Our allotment was reduced, forcing us to increase our purchase of public market power. This reduction has made it impossible for Kanab City to continue to provide electric power to its citizens at a lower rate and will cause even greater rate increases in the near future.

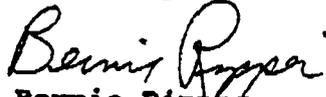
Kanab City, as is most areas served by the power generated from the Glen Canyon Dam, is economically depressed. Environmental concerns make it impossible to develop our natural resources. Our timber harvesting business has been devastated by the environmental movement. Our citizens are struggling to find work and support their families. Utility rate increases would be fatal to our area.

Mr. Roland Robison
Page 2
October 17, 1991

It is our understanding that granting a maximum exception of 3 percent, limited to 22 hours a month, would save the customers of this power source nineteen million dollars a year. We hope this savings to the consumers of this power source would be considered in the decision making process.

Kanab City supports the balanced use of all of the resources of the Colorado River. We urge those involved to implement a balanced plan for the operating of the Glen Canyon Dam generators. Permitting the 3 percent exception would be the least that could be done to accommodate this balance.

Sincerely,


Bernie Ripper
Mayor

BR/klm

cc: Honorable Manual Jujan Jr.



HUALAPAI TRIBAL COUNCIL

P.O. BOX 178 • PEACH SPRINGS, ARIZONA 86434 • 602 766-2218

October 18, 1991

Lee J. McQuivey, Chief, CRSO
Bureau of Reclamation
Upper Colorado Region
123 South State Street
P.O. Box 11568
Salt Lake City, Utah 84147

Dear Mr. McQuivey:

The Hualapai Tribe appreciates being able to make comments on your Draft Environmental Assessment on Glen Canyon Dam Interim operating Criteria. The Hualapai Tribe would like to make the following suggestions.

- 1) I-3 line 4: insert Hualapai Tribe as well.
- 2) I-4 line 9: insert Hualapai Indian Reservation
- 3) II-2: Reword and put in what was agreed to at the Cooperating agencies meeting October 15-16, 1991.
- 4) II-3 line 30 and 31: If the 1992 Hualapai proposal is funded this statement might not be true.
- 5) III-3 line 10: insert Hualapai Indian Reservation lands.
- 6) III-5 line 3: insert Hualapai Indian Reservation.
- 7) III-9 line: Were not sure that this statement is true.
- 8) III-9 line 15: There would be a large impact if western decided to use the exception criteria one hour a day during the work week through the month.

The Great Spirit created Man and Woman in his own image. In doing so, both were created as equals. Both depending on each other in order to survive. Great respect was shown for each other in doing so. Happiness and contentment was achieved then, as it should be now.

The partnering of the male makes them one person; for happiness or contentment can not be achieved without each other.

The Canyon are represented by the people in the middle ground, where the people were created. These canyons are sacred and should be protected at all times.

The Reservation is pictured to represent the land that is ours, that it is a gift.

The Reservation is our heritage and the heritage of our children yet unborn. We died to our land and it will continue to be good to us.

The Sun is the symbol of life, without it nothing is possible -- the plants don't grow -- there will be no life -- nothing. The Sun also represents the dawn of the Hualapai people. Through hard work, determination and education, everything is possible and we live better lives and brighter days ahead.

The tracks in the middle represent the people and other animals which were here before us.

The stars around the symbol are the stars, representing our lives in the future, and the stars are the stars of the future.

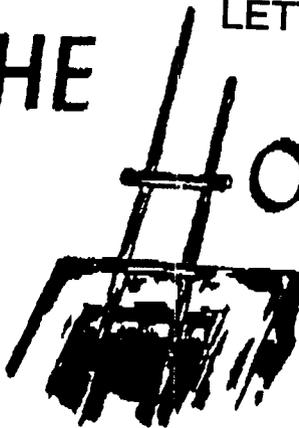
- 9) III-11 line 5: It would be nice to see the data to support this.
- 10) III-12 line 4: Once again it would be nice to see the data to support this.
- 11) III-13 line 12: This last sentence seems to contradict what was said at the beginning of the paragraph.
- 12) III-15 line 2: This last sentence seems to contradict what was said at the beginning of the paragraph.
- 13) III-16 line 10: There is once again a contradiction as to what was stated in the beginning.
- 14) III-16 line 13: The Rozerbeck sucker has been listed as threatened or endangered.
- 15) III-17 line 10: It would be nice to see impacts of Financial Exception Criteria Option here as well.
- 16) III-18 line 5: If western end B.O.R. went to 31,500 csf to prove capacity cultural sites could be impacted. This must be mitigated.
- 17) III-21 line 14: It would be nice to see the data to support this.

The Hualapai Tribe feels the document is well written in light of the very short time available for its preparation. We hope our suggestions will be considered in the Final Draft.

Sincerely


Earl Hovatone, Chairman
Hualapai Tribe Council

LETTER 11
THE HOPI TRIBE



Vernon Masayeva
CHAIRMAN

Patrick C. Dallas
VICE-CHAIRMAN

October 18, 1991

Mr. Gordy Lind
Bureau of Reclamation
Upper Colorado Regional Office
Salt Lake City, Utah

Dear Mr. Lind:

The Hopi Cultural Preservation Office has reviewed our copy of the "draft" Environmental Assessment on the Glen Canyon Dam Interim Operating Criteria and would like to provide you with our comments.

Our office has one very important comment to make concerning the treatment and assessment of impacts to Cultural Resources in Chapter III, page 17. We note that there is a complete absence of consideration for the Native American concerns relating to the identified archaeological sites which may be impact and a failure to address the issue of traditional cultural areas or sacred places that are important to Native Americans within the impact area.

The Hopi Tribe requests that a final Environmental Assessment not be completed until the Hopi Tribe has been given an adequate chance to respond with their concerns. A statement from the Hopi Tribe will follow within one weeks time of receipt of this letter.

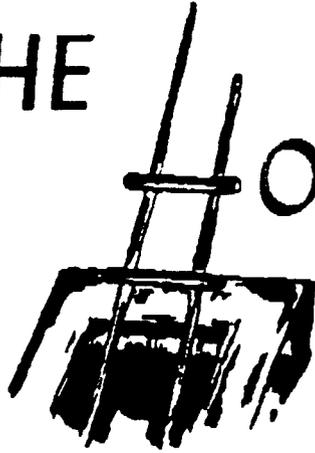
If you have any questions or comments please feel free to contact Mr. Kurt Döngoske, Tribal Archaeologist or me at (602) 734-2441, extension 201.

Sincerely,

Leigh Jenkins, Director
Cultural Preservation Office



THE
HOPI TRIBE



Vernon Masayesva
CHAIRMAN

Patrick C. Dallas
VICE-CHAIRMAN

October 24, 1991

Mr. Gordy Lind
Environmental Protection Specialist
Upper Colorado Regional Office
Bureau of Reclamation
UC 1500
P.O. Box 11568
Salt Lake City, Utah 84147

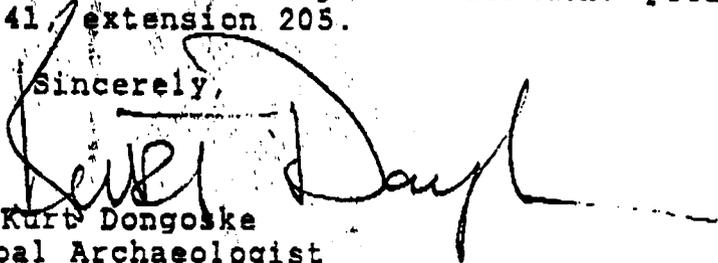
Dear Mr. Lind:

Please find enclosed the Hopi concepts and beliefs concerning the Grand Canyon and the resources therein for inclusion into the Environmental Assessment for the Glen Canyon Dam Interim Flows.

Due to the extremely general nature of the assessment of impacts to the resources within the Grand Canyon due to the interim flows and the exception criteria, the Hopi Tribe can only present their position in a somewhat similar way.

If you have any questions concerning this document please contact me at (602) 734-2441, extension 205.

Sincerely,


Kurt Dongoske

Tribal Archaeologist
Cultural Preservation Office

THE ROLE AND IMPORTANCE OF THE GRAND CANYON IN HOPI CULTURE AND SOCIETY

To the Hopi people and for many other Native Americans the Grand Canyon is not only a historic place but a spiritual place as well. The Grand Canyon is a place of special cultural and religious significance to the Hopi people and it is deeply connected to their lifeways. The Grand Canyon is important to the Hopi people for spiritual, cultural, and historical reasons. The religious shrines, springs, locations of medicinal herbs, archaeological sites, and other sacred places in the Grand Canyon are important because of their role in perpetuating the Hopi life and culture. These places provide a vital spiritual and physical link between the past, the present, and the future.

The Hopi people emerged into this present world, the Fourth World, from the Sipapuni, a travertine cone at a spring located along the Little Colorado River several miles upstream from its confluence with the Colorado River. After their emergence, the Hopi people followed divine instructions and prophecies received from the caretaker of this world, Ma'asaw. These instructions led Hopi clans to their current homes at the center of the universe on the Hopi Mesas. Upon their arrival in this world, some Hopi clans left immediately on a long and circuitous migration, while other clans resided for some time in the Grand Canyon prior to moving on to the Hopi Mesas.

Hopi oral history records a number of clans residing in the Grand Canyon, including Snake, Horn, Deer, and Antelope Clans. During a recent trip through the Grand Canyon, Hopi Elders also observed symbols of the Fire, Strap, Spider, Kachina, Lizard, Turkey, Bow, Water, Bear, Greasewood, and Badger Clans immortalized in petroglyphs. The many hand prints at rock art sites in the Grand Canyon are interpreted as the markings of the area by clan leaders during Hopi migrations.

The Hopi people continue to use the Grand Canyon for very important ceremonial and ritual purposes. The Hopi Salt Mines on the Colorado River are the focus of an arduous religious pilgrimage associated with the initiation rites of Hopis. The Twin War Gods established the steep trail of this salt pilgrimage down the walls of the Grand Canyon, and identified many shrines where offerings and rituals were to be conducted along the way. The placement of clan symbols at various shrines and other locations by Hopis on the pilgrimage is one aspect of the rituals. In addition to salt, a number of pigments are collected during this pilgrimage for use in Hopi ceremonies. The Hopis continue to use these places in their prayers, and make offerings to them during winter ceremonies conducted on the Hopi Mesas.

All of the springs in the Grand Canyon have a spiritual

importance to the Hopi people. In addition, one of these springs, Vasey's Paradise, was where the Spanish priests at Awatovi and Oraibi made the Hopi people go to collect holy water and drinking water for the Catholic missions.

The Hopi people believe that the Grand Canyon is where they go to reside after death. All of the Hopi ancestors thus have returned to the Grand Canyon and now spiritually occupy it. The presence of their ancestors make the Grand Canyon an especially holy and spiritually dangerous place. All use of the Grand Canyon thus requires proper spiritual preparation and a respectful attitude.

The Grand Canyon is exceedingly important to the Hopi people not only because it is the setting for much of Hopi prehistory and history, but also because it has contemporary spiritual significance in their culture and religion. The Hopi people's concerns about the Grand Canyon are rooted in a spiritual and historical connection to the area inherited as a patrimony from the Hopi ancestors who resided there.

HOPi CONCERNS ABOUT EROSION IN THE GRAND CANYON

The Hopi people consider the natural erosion caused by wind and the runoff of rain and snow to be part of the course of nature which should be left unimpeded. However, erosion caused by man-made activities is regarded differently, and the Hopi people think this type of erosion should be stopped to protect the sacred land. The Hopis believe that humans are stewards of the earth, and need to take care of the earth to nurture all living things. Hopi people respond to scientific studies that suggest or demonstrate a relationship between the operation of Glen Canyon Dam and erosion in the Grand Canyon by stating that the Federal government should operate the dam to prevent erosion and any indirect impacts that may result from it such as damage to archeological sites and disturbance of human graves.

HOPi VALUES ABOUT PRESERVATION OF ARCHAEOLOGICAL SITES AND TREATMENT OF HUMAN REMAINS

Hopi people have a number of concerns about archaeological sites being damaged or potentially damaged by erosion in the Grand Canyon. Many of these archaeological sites are ancestral villages, and the Hopis value these sites as markers on the landscape that serve to physically document their cultural claim to the land. For this reason, they think all ruins should be protected and left as they are. When ancestral ruins are being damaged by humanly caused erosion, the Hopi people support the salvage archaeology needed to preserve the information and artifacts contained within these sites.

The Hopis have a rich interpretive scheme for assigning meaning to rock art, and they believe that all rock art threatened by erosion caused by fluctuating flows from the Glen Canyon Dam

need to be thoroughly recorded and preserved in a documentary record. Like ruins, this rock art serves as markers that tie modern Hopi people to the land inhabited by their ancestors.

Proper respect for and treatment of the dead are extremely important values in Hopi culture, and the Hopi people are therefore greatly concerned about the disposition of the ancestors of the modern Hopi people that are buried in the Grand Canyon. The Hopi people do not think that any human graves should be excavated solely to satisfy scientific curiosity. However, when graves are threatened by disturbance from humanly caused erosion, most Hopis think that these graves should be moved out of the danger zone by archaeologists. Non-destructive osteological study of human remains during the process of relocating graves is acceptable to most Hopi people. All Hopi people think that all human remains and the grave offerings left with them should be reinterred and not taken out of the canyon.

HOPI CONCERNS FOR BIOLOGICAL RESOURCES

The Hopi people think that all living things play an important role in creation and therefore have a right to exist. Even though most Hopi people have never heard of the Humpback Chub, they are universally concerned when they learn that this fish is an endangered species. The Hopi people think the loss of this fish would impoverish the world, and thus have a negative impact on Hopi life. People from the Water Clan have a special affinity to all creatures that live in water, and they are especially concerned about endangered fish. The Hopis think that the Glen Canyon Dam should be operated to protect all fish and other living animals in the Grand Canyon.

The Hopi people are glad to learn that the population of eagles has recently increased in the Grand Canyon. Eagles play an important role in Hopi rituals, and many Hopi ceremonies require eagle feathers. The Greasewood Clan, whose eagle collecting area abutts the Grand Canyon, will benefit directly from the increase in the eagle population.

The Hopi people are concerned about plants as well as animals. Hopi elders have identified many medicinal herbs in the Grand Canyon. The Hopis think that the Glen Canyon Dam should be operated to prevent damage to plant communities caused by erosion.

OTHER HOPI CONCERNS

Given the sanctity of the Grand Canyon, the Hopis are concerned about the attitudes of people who use the canyon for recreation or scientific research. With the proper attitude, use of the canyon for these purposes can be both enjoyable and educational. Using the canyon with a disrespectful attitude can cause serious spiritual problems. The Hopis are particularly concerned about recreational raft trips that stop at the Little

Colorado River and allow people to hike upstream out of the National Park to the Hopi Sipapuni. The Hopi people think this area should be given the same status as the Hopi Salt Mines, and be made-off limits to non-Indians.

The Hopi people cannot support the concept and terms of the exception criteria, and more specifically the financial exception criteria provided for Western Area Power Administration for the operations of the Glen Canyon Dam. It is the position of the Hopi Tribe that the protection of the natural and cultural environment within the Grand Canyon is of ultimate priority, and that the operations of the Glen Canyon Dam should reflect the United States government's commitment to the preservation of its natural and cultural heritage; not its past history of evaluation and treatment of natural and cultural resources in terms of a dollar sign. Furthermore, the Hopi Tribe cannot accept the concept and terms of the exception criteria that requests of the Hopi people the compromising of their spiritual and religious beliefs and perceptions of the Grand Canyon.

CONCLUSIONS

Whereas historic preservationists and archaeologists regard archaeological sites in the Grand Canyon as properties important for representing of studying the past, the Hopi people place the highest value on these same sites for their role in the living, ongoing Hopi culture. The Grand Canyon is important to the Hopi people not only because it is the setting for much of Hopi prehistory and history but also because it has contemporary spiritual significance in Hopi culture and religion. The Hopi people think that the historic sites and their natural setting in the Grand Canyon should be preserved for future generations of Hopi people.





Garkane Power Association, Inc.

"Serving Scenic Southern Utah And Northern Arizona"

P.O. Box 790, Richfield, Utah 84701

801-896-5403, TX #: (801) 896-8079

October 18, 1991

Mr. Roland Robison, Regional Director
BUREAU OF RECLAMATION
P.O. Box 11568
Salt Lake City, UT 84147

Dear Mr. Robison:

Garkane Power Association welcomes the opportunity to comment on the "Glen Canyon Dam Interim Operating Criteria and Environmental Assessment."

Reducing the generating capacity of Glen Canyon Dam has a significant adverse financial impact to all of the preference customers in the Upper Basin. We are the entities that will have to pay the cost of the replacement power that "Western" will have to purchase. The statement that the proposed changes in flows will not have any significant financial impact on power operations is simply not true. If the maximum flow is limited to 20,000 CFS, that will reduce the generating capacity to 840 MW and that will end up costing us a significant amount of money.

We feel that the Secretary of Interior should at least approve the proposed "Operational Exception Criteria" which would save the preference customers \$19 million in fiscal 1992 allowing a maximum exception of 3% or 22 hours a month. This would save Garkane Power Association 10.7% on their WAPA power costs or approximately \$268,000 per year.

The rural area which Garkane serves in Southern Utah and Northern Arizona is already fighting for its economic life because of the cutbacks and shutdowns of the saw mills and the uranium mines. Our residential and struggling industrial customers cannot afford these proposed WAPA power rate increases. Garkane has no choice other than to pass our increased power costs on to our consumers and most of our customers have no way to pass these costs on to others.

It is not fair for the power users to pay all the costs of the "Low Fluctuating Flow Alternative", the E.I.S., and the other costs associated with protecting the Grand Canyon. Other users and the general public, who receive benefits, should also share in the costs.

The U.S. Government has a moral obligation to replace any lost capacity at the Glen Canyon Dam or to at least seriously

"DISTRICT OFFICES OPERATING IN:"

Los, Utah 84747 - Box 67 - 801 - 836-2795 - 836-2370 • Hatch, Utah 84735 - Box 311 - 801 735-4286 - 735-4267
Kanab, Utah 84741 - 1802 South 175 East #175 - 801 - 644-5026 - 644-3739
Boulder Hydro Plant - Boulder, Utah 84716 - (801) 335-7324

Mr. Roland Robison, cont.
October 18, 1991
Page 2

investigate, despite political and environmental objections, the possibility of constructing a re-regulation dam on or adjacent to the Colorado River below the Glen Canyon Dam. This concept was a part of the original Upper Colorado River Project Plans. I know that sites for a dam on the Paria River and in Marble Canyon were studied in some detail.

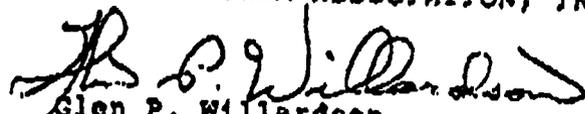
In 1964 Garkane Power Association signed a contract to purchase what it thought would be our entire future power supply from the United States Bureau of Reclamation. We could have signed other long-term power supply contracts or even built additional small hydro plants of our own, but we elected to build a transmission line into Glen Canyon and support the Upper Colorado River Storage Project. We spent over a million dollars in 1964 and 1965 building 69 kv transmission lines so we would be able to utilize the power produced at Glen Canyon.

If we had known that our allocation of power from Glen Canyon Dam would be reduced and that the cost of the federal power would increase substantially over time, we would not have contracted with the USBR at that time. We would likely have continued to build small hydros of our own where we would at least have had some control of the ultimate costs.

Garkane supports the oral and written statements of CREDA, Western, ICPA, and all those who favor preserving the generating capacity of the Glen Canyon Dam. The Dam was constructed as a part of a multi-purpose resource project. We shouldn't throw the baby out with the bath water now. We appreciate the special efforts that the Bureau of Reclamation and Western have made to help resolve the difficult problems associated with the need to protect the Grand Canyon and the valuable power resource at the Glen Canyon Dam. They are extremely valuable to the people of this nation, both now and in the future.

Sincerely,

GARKANE POWER ASSOCIATION, INC.


Glen P. Willardson
General Manager

Blendale, Utah
October 17, 1991

Mr. Roland Robinson
U.S. Bureau of Reclamation
Salt Lake City, Utah.

Dear Mr. Robinson

My name is Jack Maxwell. I serve as a commissioner in Kane County, Utah. And also have been a director of Marble Power Assn. Inc. for thirty years. I have lived in Kane County for about fifty years and have enjoyed much growth and improvement in Kane County and surrounding areas. However recent years have brought economic setbacks to our county that are and continue to be alarming. The timber industry has been curtailed and mining is at a standstill. Livestock production, a long time product of Kane County, is severely threatened.

These unwelcome changes have been forced upon us by people who are not of our locality or sympathetic with our economic conditions.

Electric power for our county comes chiefly from Glen Canyon Dam which we appreciate very much, but the proposed increase in rates because of regulation of interm. flows have us concerned. The folks in Kane County don't need more problems. We need some help in order to continue to live here. I know the sounds pretty drastic but we do have economic problems in our area. For these reasons we would certainly appreciate your help when you make the decision on interm. flows at Glen Canyon.

Sincerely
Jack Maxwell





LETTER 14

DIXIE - ESCALANTE RURAL ELECTRIC ASSOCIATION, INC.

(801) 439-5311 • BERYL, UTAH 84714

October 18, 1991

Regional Director
Bureau of Reclamation
125 South State
Salt Lake City, Utah 84111
(Facsimile number 801 588-5499)

RE: Glen Canyon Dam Interim Operating Criteria, Draft
Environmental Assessment, dated September 1991.

I would like to make several comments and observations to
the above referenced study:

Chapter 1, Purpose and Need, Introduction, states "The
purpose of this environmental assessment is to identify and
evaluate the environmental impacts that would occur... with...
interim operating criteria...". I think it is important to fully
consider the economic impacts of interim flow criteria upon the
people served by Western and that impact should not be
downgraded, diminished or overshadowed by environmental issues
but should be a parallel issue. Economic impacts are certain to
occur under interim flows and even more so under the possibility
of reduced or eliminated exception criteria.

Judicious use of our natural resources is important and
considerations must be given to their proper use and protection
but the necessary economic requirements of people served by
Western must be given balanced consideration.

Every single present and future electrical customer of
electrical utilities receiving power from Western will experience
a definite negative financial impact. Additionally, negative
economic repercussions will be felt in each area served by
Western due to the decreased purchasing power of individual
incomes. In other words, families will have to spend more money
on power bills to underwrite environmental concerns within the
GCDEIS and, therefore, have less discretionary money to spend
elsewhere.

If one were to fully examine the overall environmental picture it would be evident that the economic considerations of people within the Western service area should be a major item of concern. If those people have a difficult time feeding their families or making house and car payments then they are unlikely to be very concerned with the environment. So, if the environmental issues raised within the Draft EA are to be seriously considered within macro-environmental parameters then they should be done so under the assumptive logic of taking care of people first, then enlist their aid and assistance to collectively support other environmental issues.

Many of our customers are living on a fixed income and have very little flexibility within their budgets for discretionary spending. We also serve many farmers who are having exceptionally difficult times. Many are going bankrupt or cutting back excessively, most because of the current high cost of power and low return on investment. Increased power costs will detrimentally affect both groups.

Operational Exception Criteria. It is vitally important for Western to have all three exception criteria mentioned. Item 3, financial exception criteria defined as a means of avoiding the expense of purchasing replacement firm capacity and energy, is listed in the Draft EA as an option. I do not agree. I believe it is essential for Western to have the capability to responsibly react to the needs placed upon it by the power marketplace and, further, to avoid possible conflict with the Anti-Deficiency Act.

Monitoring Program. There is specific reference to monitoring economic relationships associated with the power and recreation resources but no discussion or description of how that would be accomplished nor what priority it would have relative to environmental monitoring.

Serious consideration should be given to shared-costs of monitoring by the cooperating agencies and other possible sources. I believe power interests should do their fair share but I do not believe it equitable for power interests to pay the full price tag of monitoring, especially long-term.

Funding. I could not find any specific reference within the Draft EA regarding the funding for actions proscribed therein, if adopted. I believe power users are committed to participating in their fair share of underwriting the costs of the EA but the absence of specific cost estimates would perhaps lead one to believe power interests will pay all costs and, further, pay any costs. There must be some common sense guidelines enacted to control the EA and EIS process lest it exceed the reasonable capacity for funding. A case in point is the mention of 475 potential cultural sites that may require "...a proposed treatment of the sites to mitigate impacts...". Such statements, in my view, leave an impression of unbridled budgets ready to be spent on any item perceived to be potentially threatened within the Grand Canyon and on Indian lands. Close supervision should be proffered to provide reasonable protection to threatened resources while limiting the notion of carte blanche spending.

Re-regulation Dam. Although this is not referenced within the Draft EA I would urge reconsideration of the beneficial potential a re-regulation dam would have upon the impacted environmental areas indicated.

I look forward to receiving a copy of the final ES. Thank you very much for your consideration of these issues.

Sincerely,

R. Leon Bowler
RLB

R. Leon Bowler
General Manager





IN REPLY
REFER TO:

LETTER 15

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
PHOENIX AREA OFFICE
P.O. BOX 10
PHOENIX, ARIZONA 85001



OCT 18 1991

MEMORANDUM

To: Regional Director, Bureau of Reclamation
Acting

From: Phoenix Area Director, Bureau of Indian Affairs

Subject: Comments on the Draft Environmental Assessment for the
Glen Canyon Dam Interim Operating Criteria (September
1991)

The Bureau of Indian Affairs, Phoenix Area Office has reviewed the Draft Environmental Assessment (DEA) for the Glen Canyon Dam Interim Operating Criteria (September 1991) and we offer the following comments:

- 1). Cover of the DEA - Change date to reflect the final document (October 1991).
- 2). Chapter 1 - Purpose and Need - Background Section; There is no mention of who the Cooperating Agencies are in the EIS process in this section. In the Appendix, a list should be included to reference the 11 cooperating agencies in the EIS process.

Under Development of Alternatives - Please discuss what agencies are involved with each of the following groups: R/S Group, E/RM Group, P/WM Group. These need to be explained in the text or as a footnote on Figure 1 on page 1-2.

Chapter 1 first page is not numbered (1-1).

- 3). Chapter 2 - Proposed Action and Alternatives page II-2 - Financial Exception Criteria Option: Please explain to whom Western Area Power Administration (Western) needs to demonstrate that unloaded capacity at Glen Canyon Dam is available for generation? On page II-3 in bullet 3 - Specifics of how to return to the requirements after exceedance will be worked out by whom? Also on bullet 4 the review of the exception criteria would be conducted every three months again by whom? In the last paragraph of this section on page II-3 it

discusses the allowance of exceeding the exception criteria for relatively short periods of time. What does this mean? How long of time period?

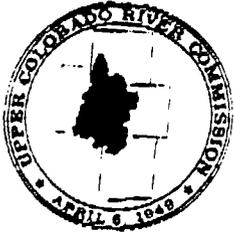
- 4). Monitoring Program - page II-3, fourth paragraph, last sentence. It states that a specific timetable and report development process has been developed and would be implemented. Again who developed the timetable and report and when is it proposed to be implemented? The second to last sentence should also include the following elements that are associated with the Hualapai Indian Reservation: wildlife resources, beaches, riparian areas and water resources.
- 5). Alternatives Considered But Eliminated - page II-4; Please explain why the intermediate and sustained fluctuating flow alternatives were eliminated and not carried through the document to be analyzed, as per NEPA requirements. Are there no other viable alternatives that could be analyzed in this DEA?
- 6). Table 3 - page II-6; This table needs to be expanded to include the alternatives that were eliminated in order for the decision-maker to compare impacts.
- 7). Chapter 3 - Affected Environment and Environmental Consequences - page III-3; Under subsection "Immediate Area" the third sentence discusses Indian reservation lands would be affected. Please explain what reservations and tribes would be impacted. Remember that there are several tribes do not have any reservation lands but have religious ties to the area.
- 8). Figure 3 on page III-4; The vicinity map should include an insert of the State of Arizona which shows the location of the major cities. Also several Indian reservation boundaries have not been included on the vicinity map including the Hopi, Navajo, Kaibab, and San Juan Southern Paiute reservation boundaries. The map should be updated to show these areas.
- 9). On page III-9 under Financial Exception Criteria Option, first sentence: what does a small increase in frequency of flows greater than 20,000 cfs could occur mean? Please explain.
- 10). Cultural Resources - page III-17, first paragraph, second sentence; 12 to 15 archeological sites may be directly affected to erosion, please explain generally where the sites are located.

- 11). Chapter 4 - Consultation and Coordination, page IV-2, Cultural Resources; this section needs to discuss that there are sacred sites in the Grand Canyon which are important to Native Americans groups and should be addressed in this document. Tribal members should be included in persons who were contacted and consulted during this process.

If you have any questions concerning the above comments, please contact our Area Environmental Quality Services at (602) 379-6750 or FTS 261-6750.

John Philbin





UPPER COLORADO RIVER COMMISSION

355 South Fourth East Street • Salt Lake City • Utah 84111 • 801-531-1150 • FAX 801-531-9705

October 18, 1991

Mr. Roland Robison
Regional Director
Upper Colorado Region
U. S. Bureau of Reclamation
P. O. Box 11568
Salt Lake City, UT 84147

Dear Mr. Robison:

The Upper Colorado River Commission, on behalf of the Upper Division States, wishes to thank you for the opportunity to review and comment on the Draft Environmental Assessment on the Glen Canyon Dam Interim Operating Criteria. Our specific comments are as follows:

1. Page I-3 - In paragraph two, we find no reference to materials provided in our April 2, 1991 memorandum to the Bureau of Reclamation or our April 17, 1991 briefings regarding the risk of establishing an upper limit on power plant releases of 20,000 cfs on operations to insure water conservation. We believe it is important for the reader to understand the explicit relationship between the proposed Interim Flow Criteria and release volumes not to exceed 8.23 maf.
2. Page III-1 - Item four under "Assumptions" - The paragraph grossly misrepresents the mechanism that normally determines release volumes. The Secretary's "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs" adopted June 8, 1970 require releases greater than 8.23 maf when necessary to equalize actual storage between Lake Powell and Lake Mead, and these releases can happen under less than full reservoir conditions. In fact, the current 1992 Annual Operating Plan developed

pursuant to these criteria would release more than 8.23 maf if 1992 runoff is a probable maximum (16.7 maf). The current 24-month study for operations of the Colorado River indicates approximately 0.8 maf of equalization releases in 1993 if the 1993 runoff is most probable, and approximately 3.5 maf through 1994 if the 1994 runoff is also most probable.

This paragraph also indicates that a release volume of 8.23 maf has been used as the basis for assessment of impacts. It has been our clear understanding that the recommended Interim Flow Criteria have been based on release volumes of 8.23 maf. We find no reference in this document to indicate that these criteria are only for a 8.23 maf release volume. If release volumes in excess of 8.23 maf are required, then other criteria must be identified and agreed upon. The possibility of releases in excess of 8.23 maf in 1992 is greater than 25%, and this increases to greater than 80% through water year 1994.

3. Page III-5 - Paragraph three under "Sediment" - This paragraph would lead the reader to understand that the beach erosion mechanism has changed considerably from the mid-1970's to the late 1980's (after the early 1980's flood years). Release volumes (+ 8.23 maf) were the same during those periods, and power plant operating criteria were unchanged. To what, then, do you attribute these changes? Will the long-term rates also be changed? Are the Interim Flow Criteria designed to arrest the 1970 rates of erosion or present-day rates?
4. Page III-7 - Last paragraph - This paragraph would lead the reader to understand that under the present operating criteria (pre-test flows), sediment conditions in the reach of the Colorado River between the Paria River and the Little Colorado River (LCR) were in approximate equilibrium. That is inflow equalled outflow. Therefore, the Interim Flow Criteria have been designed to accumulate sediment in this reach at a rate of 2 to 1 (500 tons/year in - 250 tons/year out).

This conclusion cannot be supported, however, by the statement in the preceding paragraph that 1.1 million tons/year of sediment are supplied on the average to this reach of the river.

Using this data, the current operating criteria are allowing sediment to aggrade in this reach of the rivers at the rate of 600,000 tons/year, or a ratio of 2.2 to 1 (1.1 million tons/year in and 500,000 tons/year out. This ratio exceeds the apparent goal of the Interim Flow Criteria. If these calculations are correct, are the Interim Flow Criteria really justified based on sediment transport? Were the Interim Flow Criteria in fact designed assuming far less than average sediment inflow into the Paria-to-LCR reach of the Colorado River and, if so, what are the assumptions and their justifications?

5. Page III-10 - Paragraph three - This paragraph identifies the New High Water Zone (NHWZ) as "the most valuable component of the riparian zone as wildlife habitat." This zone is identified as the zone down to approximately the 30,000 cfs stage. Some confusion exists between the definitions of the Old High Water Zone (OHWZ) and the NHWZ. The Interim Flow Criteria will significantly reduce the frequency and magnitude of flows greater than 20,000 cfs. Does this have a significant impact on the NHWZ?
6. Page III-17 - "Cultural Resources" - Of the approximately 475 archeological sites recorded in the Grand Canyon, only 12 to 15 are being directly affected by the alleged current operating criteria. It is unclear what historic condition--1983 flooding or fluctuating flows--caused the most jeopardy to these sites. Apparently the Interim Flow Criteria will only afford protection to 2-3 of these sites. If so, are these sites statistically or scientifically significant? Where are they located in relationship to (a) the main channel, (b) the influence of side canyon erosion, and (c) approximate river mile?

Are modifications in the Operating Criteria the only way to afford protection to these 2-3 sites? What is the risk of either scientific documentation and excavation or stabilization by other historically utilized techniques?

7. Page III-18 - Anglers and Day Use Rafters - Apparently trout fishing increased from non-existent prior to 1964 (pre-Glen Canyon Dam) to 52,000 angler days in 1983, and the first 15 miles between the Dam and Lees Ferry became a world-class trout fishery. However, since 1983 use has steadily dropped.

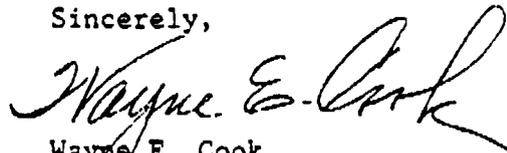
There is little discussion of the impact that changed fishing regulations and stocking practices have had on this decline. It is important to note that the same power plant operating criteria that created the world-class fishery from 1964-1983 were still in place from 1983 to July 1990 when research flows and now test flows overshadowed the criteria. To what extent has the Interim Flow Criteria design been influenced by the desire to restore this fishery?

Access to the fishery also seems to be identified as a cause of declined fishery use. Is access different now than during the period 1964-1983? If so, what has caused the access change?

8. Page IV-1 - Consultation and Coordination - This document suggests that interested parties' meetings on April 3, June 13, July 1 and September 17 and distribution of this document constitute appropriate public involvement. Did these activities also satisfy the requirements of Section 602 of Public Law 90-537 wherein the Secretary of the Interior has an obligation to consult with representatives of the Colorado River Basin States concerning matters of operating the Colorado River reservoirs? If not, has this consultation taken place, and what were the recommendations of the Basin States' representatives?

Again, thank you for the opportunity to provide these comments. If there are any questions, please contact us at the Upper Colorado River Commission office at 801-531-1150.

Sincerely,



Wayne E. Cook
Executive Director

WEC:pj

cc: Upper Colorado River Commissioners
Lower Basin States Representatives
Western Area Power Administration
Colorado River Energy Distributors Association

LETTER 17



TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.
12076 GRANT STREET P.O. BOX 33895 DENVER, COLORADO 80233 (303) 452-6111

October 18, 1991

Lee McQuivey
Program Manager
Colorado River Studies Office
Box 11568
Salt Lake City, Utah 84147

Dear Mr. McQuivey:

Attached is a generalized list of comments on the adequacy of the Draft Environmental Assessment on the Glen Canyon Dam Interim Operating Criteria.

We would be glad to discuss in detail all of these comments and would have been more expansive if we had more time.

Sincerely,


Frank R. Knutson
General Manager

FRK/RB/dvs

Attachments

E-71

DVS#129





LETTER 18

United States Department of the Interior

NATIONAL PARK SERVICE

P.O. BOX 37127

WASHINGTON, D.C. 20013-7127

IN REPLY REFER TO:

L7619(774)

October 23, 1991

Memorandum

To: Regional Director, Upper Colorado Region, Bureau of Reclamation,
Salt Lake City UT

From: National Park Service EIS Coordinator, Salt Lake City UT

Subject: Comments - Draft Environmental Assessment, Glen Canyon Dam
Interim Operating Criteria

We appreciate the opportunity to review and provide comments on the subject document. The date of this response is a reflection of the fact that the environmental assessment (EA) was not received at Glen Canyon until October 9, 1991, and at Grand Canyon, October 11, 1991, the date comments were requested.

Given the short time frame in which the EA was drafted, we think the preparers have done an excellent job of summarizing the issues and comparative impacts. The National Park Service believes the EA would be adequate by addressing the comments and recommendations which follow.

General Comments:

It is inaccurate to portray the set of interim flow criteria as static. The current criteria represent a starting point suggested by review of the best available data. The flexibility we have to constantly reexamine and refine all components of the interim flow package, should be recognized. This flexibility should be articulated in the discussion of the monitoring program on page II-3, as it is outlined in the 10/17/91 Draft Interagency Agreement on exception criteria. The criteria should include lead agency consultation with managing agencies to assess ecosystem responses to the various interim flow parameters.

With regard to river sediments, National Park Service management objectives are directed at sediment deposits of all types. It is recommend that the term "sediment deposits" be used in place of the generic reference to "beaches" (as on page II-1, paragraph 1), which is widely used in connection with only those types of deposits favored by river runners as camp sites.

Where the 1988 Glen Canyon Environmental Studies (GCES) Final Report is cited, it would be more professional to cite the specific research report used in the in the preparation of the GCES report.

COMMENTS

Glen Canyon Dam Interim Operating Criteria

Draft Environmental Assessment

September, 1991

GENERAL

1. Places unjustified reliance on the GCES Phase I study data that has been categorized as inadequate by the National Academy of Scientists.
2. Does not analyze non-operational mitigation measures.
3. Does not address negative impacts to vegetation and other assessment concerns between the Old High Water Zone (OHWZ) and New High Water Zone (NHWZ) and the accumulative impacts on other assessment concerns.
4. Does not address overall impact to wetlands (net loss or gain).
5. Does not provide adequate discussion of flood flows on all assessment concerns downstream.
6. Inadequately addresses economic, social and environmental impacts from power operations.

Specific Comments:

1. Page I-3, paragraph 1 - the "best estimate" of project scientists was seasonally adjusted steady flows, the recommendation they put forth was designed to reduce the greatest amount of impact, while continuing to make provision for peaking power needs.
2. Page I-3, line 14 - The intermediate Fluctuating Flow alternative sought to provide significant protection to downstream resources - but did not! This is why it was rejected.
3. Page I-4, paragraph 2 - the purpose of research flows was not merely to "provide data", but rather as a means of conducting comparative analysis of potential alternatives for the environmental impact statement (EIS).
4. Page II-1, final sentence - This should be revised to read, "Flows could be fluctuated within the allowable daily range up to . . ."
5. Page II-2, Financial Exception Criteria Option, line 5 - the "obligations" should be identified as marketing contracts.
6. Page II-3, line 7 - The agreement contained in Section 8.4 of the 10/17/91 draft of the Interagency agreement on exception criteria should be specified here, namely that the use of financial exception criteria will be suspended if the 22 hour limit is exceeded.
7. Page II-4, line 16 - The remaining substantial impacts of the Intermediate Fluctuating Flow Alternative should be summarized briefly.
8. Page II-6 - Table 3 should be relocated to Chapter III. Under Fisheries, Low Fluctuating Flows, Native fishes, note the potential for backwater habitat improvement through solar heating. Under Trout, note that there would be diminished potential for de-watering redds and diminished potential for stranding. Under Low Fluctuating Flows, footnote 4 references possible adverse impacts from the use of financial exception criteria. The National Park Service would not accept the use of these criteria if such impacts do occur. Under T & E Species, Low Fluctuating Flows, Fish, note the potential for improvement in recruitment of Humpback chub and Razorback sucker as a result of the potential for improved solar heating and lesser de-watering of backwaters. Footnote 5, the \$19 million savings is speculative. The EA should reference any actual cost increases due to interim flows without exception criteria since August 1, 1991.
9. Page III-1, Assumptions, line 4 - This wording is confusing and should be redrafted.
10. Page III-1, Assumptions, line 22 - Note that in shallow water habitats, water is also a key factor and equally controls the response of biological resources - particularly the fluctuation of water level.

11. Page III-3, Area of General Influence - add "Within the area of influence, and downstream of Glen Canyon Dam is Grand Canyon National Park, a World Heritage Site, and that portion of Glen Canyon National Recreation Area containing the remaining 15 miles of Glen Canyon not inundated as a result of the dam.
12. Page III-3, Resources - Aesthetics would be affected by the proposed action and should be evaluated in connection with recreation. The mass wasting of margin deposits would be reduced, lessening the adverse aesthetic impacts of bank caving, trees falling into the water, etc.
13. Page III-5, Sediment, paragraph 3 - Cite sources, Schmidt and Graf in first sentence? Patten in final sentence?
14. Page III-5, Affected Environment - Please note in the text that the National Park Service places the highest ecosystem priority on the preservation of sediment deposits, because sediment is the crucial link in the post-dam environment. Sediment is required to sustain backwater habitats, is necessary as substrate for vegetation, it is critical to the stability of archaeological sites, and the maintenance of camping sites.
15. Page III-6, line 12 - add to the concluding sentence: " if there is sufficient channel storage to support aggradation.
16. Page III-7, line 1 - change to read: "water, which will then seep from the deposit causing rill, reducing . . ."
17. Page III-7, Replenishment of Sand Bar Deposits, River Flow - Cite the source of these very specific numbers.
18. Page III-9, line 4 - Cite the specific source.
19. Page III-9, line 6 - change to read: "accumulated in the channel, however when the channel is depleted of sediment, spills of the same magnitude would be expected to have the opposite results. The clear water would erode sediment deposits."
20. Page III-10, Woody Plants, paragraph 3 - Add a discussion of relationship between discharge and the completion between Tamarix and Salix - cite Stevens.
21. Page III-11, Financial Exception Criteria, line 3 - add "except through the potential loss of substrate as a result of erosion processes on sediment deposits."
22. Page III-11, Wildlife, Low Fluctuating Flow Alternatives Consequences, line 5 - Delete "naturally high flood flows" and insert "clear water spill releases" of 1983.

23. Page III-13, line 1 - change to read: "favorable habitat (due to greater potential for solar heating and reduction of the amount of cold water flushing in backwaters)" during . . .
24. Page III-13, Rainbow Trout - Following the first sentence add the following: "Periods of daytime exposure can result in desiccation of cladophora beds (Blinn and Stevens, unpublished results)." Also, on line 5, add to the end of the sentence: sites "and desiccating cladophora beds."
25. Page III-13, Threatened and Endangered Species, paragraph 1 - Add the following sentence: "National Park Service management within the study area establishes native fishes as the highest priority T & E species, with regard to management action in support of preservation."
26. Page III-14, Bald Eagle, line 21 - At the end of the sentence add: for bald eagles "although a reduced range in flows could equate to reduced access by trout into Nankoweap Creek during low flow months." Also, on line 23, following "and larval development," insert "but potentially improve access into Nankoweap Creek".
27. Page III-15, Humpback Chub, line 2 - Add the following sentence: "The National Park Service identifies the Humpback Chub as its highest priority T & E specie, in terms of requiring management action in support of preservation. Native fish management takes precedent over trout management."
28. Page III-16, line 11 - Add the following sentence at the end of the paragraph: "These impacts would be mitigated by curtailing use of financial exceptions during periods of highest sensitivity."
29. Page III-16, Razorback Sucker - At the end of the Financial Exception Criteria Option, add the following sentence: "These impacts would be mitigated by curtailing use of financial exceptions during periods of highest sensitivity."
30. Page III-16, Flaveria Mcdougalli, Affected Environment/No Action Alternative Consequences - Note that it has recently been found on Hualapai lands downstream of Lava Falls.
31. Page III-17, Cultural Resources - The direct impact of the No Action alternative is believed to be greater than stated here. Additional information will result from meetings with the Advisory Council on Historic Preservation and the Arizona State Historic Preservation Officer.
32. Page III-17, Cultural Resources, line 1 - The number of archaeological sites is 495. Also, in line 2, change "12 to 15" to "44" are directly subject . . ."

33. Page III-17, Cultural Resources, Low Fluctuating Flow Alternative Consequences, line 3 - at the end of the sentence add: "6 to 8 sites".
34. Page III-20, paragraph 3, line 1 - change "past 5 years" to "past 10 years".
35. Page III-20, paragraph 4, - At the end of the paragraph, add the following sentence: "Permits are issued for periods as long as 18 days."
36. Page III-20, paragraph 7 - At the beginning of line 5, add "and coordinate with other groups" to ensure . . .
37. Page III-20, paragraph 8, line 3 - following "water levels," insert "moored boats may be stranded and " gear may . . .
38. Page III-21, Low Fluctuating Flow Alternative Consequences - Begin the existing sentence with: "During brief periods of exception"there would be no . . ., and add the following sentence: "Longer periods of exception operation would likely result in impacts similar to those under the No Action alternative."
39. Page III-22, lines 2 and 3 - The amount of capacity and energy going to these customers should be identified in the text.
40. Page III-24, line 8 - As stated earlier in these comments, the National Park Service would not accept the continued use of financial exception criteria if "significant" impacts occur.
41. Page III-26, Cultural Resources, paragraph 2 - This discussion should be rewritten to indicate the likelihood of this having occurred, since monitoring data is not sufficient to make determinations at this time. Also "loss of cultural resources" on line 2 should be changed to read "rate at which cultural resources are being lost" has been . . .
42. Page IV-2, Cultural Resources, line 3 - Change "475" to "495".
43. Page IV-3, Executive Orders - Note that the Secretary of Interior has consulted with the Basin States.

44. Page IV-3, Distribution List - Add "State Historic Preservation Officer, State of Arizona".

If questions arise with regard to these comments, please let me know.

Raymond Gunn

Raymond Gunn

cc:

WASO-774, Mr. Hoogland

RMR-PP, Ms. Turk

GLCA, Superintendent, Mr. Wood

GRCA, Superintendent, Mr. Neusaenger, Mr. Mitchell

LAME, Superintendent, Mr. Burke

bcc:

774

774-Gunn





October 12, 1991

Mr. Roland Robinson
Bureau of Reclamation
Upper Colorado Regional Office
P.O. Box 11568
Salt Lake City, UT 84147

Dear Mr. Robinson:

Thank you for the opportunity to provide comments on the Draft Environmental Assessment for the Glen Canyon Dam Interim Operating Criteria.

GENERAL COMMENTS

America Outdoors supports the Low Fluctuating Flow Alternative (Proposed Action) as presented in the Draft Environmental Assessment. However, we do not support incorporation of the Financial Exception Criteria at this time.

The request for Financial Exception Criteria by Western Area Power Administration is without merit or adequate justification. The estimate of \$22 million is based on a worst case scenario 100% of the time that power needs to be purchased and presumes illegal collusion from vendors. (See study prepared by David Marcus entitled Exceptions to the August 1991 Glen Canyon Dam Operating Criteria, October 2, 1991 provided as Appendix 1 to the comments provided by the Grand Canyon Trust.)

Most importantly, it is time for the burden of proof to be placed on Western Area Power Administration. For fourteen months we had test flows in the Grand Canyon, some of which had highly adverse impacts on the resources downstream from Glen Canyon Dam. If Financial Exception Criteria are allowed, then we will have no way of really knowing what the costs to Western would have been without the exception criteria. Only by disallowing Financial Exception Criteria, and applying the necessary data collection methods to the monitoring program, can we learn what the costs of purchasing replacement power might be.

SPECIFIC COMMENTS

1. On page I-4 it is stated that "The Action proposed in this environmental assessment would provide interim protection to the resources for the short term ..." This statement is incorrect by your own admission later in the document: "There has been a reduction, but not a total cessation, of the erosion process." Throughout the development of the interim operating criteria the Senior Scientist has consistently represented the parameters of the criteria as providing "acceptable" resource impacts for the short term. That there would be continued impacts has always been acknowledged. A more correct and safer substitute statement would be, "The proposed action would provide some mitigation for resource impacts for the short term ..."

2. On page II-3 it is stated that "A review of exception criteria would be conducted every three months with a view toward necessary changes or possible termination." I do not feel that financial exception criteria is warranted. However, if you do incorporate financial exception criteria, I urge you to incorporate an automatic default mechanism that stipulates, "Following a review of exception criteria every three months, lacking agreement between the parties, the exception criteria will be dropped."

3. That financial exception criteria "could be in effect for as long as 12 to 14 hours in a single day" (page II-3) supports my fear that financial exception criteria could be abused. Extended violation of the interim operating criteria is acknowledged as having the greatest likelihood of adverse impact on resources.

4. On page II-3, the monitoring program should specify what will be included regarding the monitoring of economics. For example, as was discussed on September 16 in Phoenix, Western Area Power Administration should log more than just the final price agreed to with a single utility when purchasing power. Western should log all prices throughout any negotiating process, including the prices declined. This practice would have two potential benefits: it might provide more accurate prediction of variable pricing under what circumstances and may also provide an additional deterrent to collusion by vendors (as well as possible proof of non collusion) if they knew their every offer, acceptance, and nonacceptance was being logged.

5. I find the discussion on White-water Boaters on pages III-20 and 21 generally well written and accurate. I especially support the paragraph which begins, "There are indications that certain types of flow patterns in the long term may reduce the number of sandy beaches in the Grand Canyon." My own professional experience supports the entire paragraph which follows that topic sentence.

However, I take great exception to the statement that "Partly as a result of the flow regulation of Glen Canyon Dam, this has grown into a \$14 million-a-year industry according to NPS records." The Bureau of Reclamation and Western Area Power Administration consistently attempts to attribute the growth of whitewater rafting in the Grand Canyon to the regulated flows provided by Glen Canyon Dam, and I don't believe it's true. To my knowledge, there has not been a single study that identifies or supports this attribution. The building of Glen Canyon Dam and the growth of whitewater rafting are purely coincidental. If the dam had never been built, there would still be a strong whitewater rafting industry in the Grand Canyon, just substantially different in terms of the type of craft operated on the river any given time of the annual flow cycle.

Moreover, the \$14 million appears low. Please include more information, for example the year of the NPS figure and a statement such as, "This figure does not include a considerable contribution to local economies in the form of meals, lodging, and transportation purchases."

I concur that, "A major concern of white-water boaters is the potential loss of beaches..." (page III-21), but our concerns go much beyond just the beaches. Our product is an experience in the Grand Canyon that incorporates the opportunity to view wildlife, appreciate, learn about, and value a dynamic natural ecosystem, esthetic appreciation, and other values related to a wilderness experience. Please don't characterize our interests as wholly focused on beaches and ease of trip scheduling.

6. At the bottom of page III-24 you appropriately state "If Western cannot modify its contracts, Western's estimate of cost to purchase replacement energy and capacity is \$22 million in FY 1992." Yet elsewhere you present Western's "estimates" as fact. Please correct those representations, for example: change "Western would save \$19 million" to Western estimates it would save \$19 million" (page III-24) and on footnote #5 on page II-6 "savings of \$19 million in power purchase costs" insert the word "estimated." In fact, in the interest of thoroughness and accuracy you should state, "according to Western's estimates of power purchases based on the highest anticipated price 100% of the time it needs to purchase power..."

7. Under "Preliminary Findings of Test Flow Impacts" on page III-26 I agree that "The effects of the test on recreation in the Grand Canyon have been positive." According to my experience in the Canyon in August, you could expand beyond "safer passage" to include, "Additional opportunities for camping have been made available due to the opening up of beach area between the high water lines of 20,000 c.f.s. and 28,000 c.f.s."

COMMENTS ON THE INTERAGENCY AGREEMENT

Since the draft Interagency Agreement was provided along with the Draft Environmental Assessment, I will comment on it as though it is an integral part of the E.A. I reiterate my strong objections to incorporation of financial exception criteria to the agreement between the two agencies. However, my comments which follow are provided in the event you do not heed by position.

Article 8.3 stipulates the circumstances under which the Secretary of the Interior would have the right to suspend Section 8.2. My preference would be to change the term "right" into "obligation" (to suspend Section 8.2). Knowing that's an extreme position, I urge that you at least make Section 8.2 an automatic suspension for the next 30-consecutive-day period in the event the 3 percent exception is exceeded, "to allow time for the Secretary (or Commissioner) an opportunity to investigate the conditions under which the terms of the contract were violated."

Under Exhibit B (first page) paragraph 1. a.: Strike "... or at an appropriate rate as agreed between the parties" unless you want to include all the parties (cooperators). Therefore, it would be procedurally far less cumbersome to strike the language.

Also under Exhibit B, paragraph 2. a. you state "ramp down at 2,500 cfs per hour or an appropriate rate as agreed upon ...". There are three problems with this statement: (1) Strike "or at an appropriate rate" as per my paragraph above, (2) 2,500 cfs per hour must be changed to be consistent with the 1,500 (down) ramping rate already established by the Secretary of Interior in the test interim operating criteria, and (3) add the words "no greater than" [1,500 cfs].

Again, thank you for the opportunity to provide these comments. I look forward to a timely completion of the Final Environmental Assessment.

Sincerely,



Rob Elliott
Conservation Chairman