

GLEN CANYON DAM ENVIRONMENTAL IMPACT STATEMENT

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BACKGROUND PAPER

March 1990

**Bureau of Reclamation
Upper Colorado Region**

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BACKGROUND PAPER

INTRODUCTION

Objective of the Background Paper

It is the purpose of this background paper to provide the public with historical and factual information on issues and concerns associated with the effects of the operation of Glen Canyon Dam on the downstream environmental and ecological resources of Glen Canyon National Recreation Area and Grand Canyon National Park. Information is being provided on the current operation of the dam. Information is also being provided on an array of potential elements of yet undeveloped alternatives to minimize, consistent with "The Law of the River," the impact of operations on these resources. The development of such alternatives will be facilitated through the Glen Canyon Dam Environmental Impact Statement (GCD-EIS) public scoping process. It is the purpose of this document to provide the public with sufficient information to effectively participate in the public scoping effort.

The Glen Canyon Dam Environmental Impact Statement

On July 27, 1989, Secretary of the Interior Manuel Lujan announced that the Bureau of Reclamation (Reclamation) would prepare the GCD-EIS to consider alternatives to the operations of the Glen Canyon Dam as they effect the downstream ecological and environmental resources. Subsequently, Reclamation issued a notice in the Federal Register, dated October 27, 1989, formally announcing the public involvement process for the GCD-EIS.

The National Environmental Policy Act (NEPA) process consists of an evaluation of the

environmental effects of Federal actions. The public has an important role in the NEPA process, particularly during scoping, in providing input on what issues should be addressed in the GCD-EIS.

The GCD-EIS will evaluate the possible impacts on downstream environmental and recreational resources from the current operation of the existing dam. Also it will identify and evaluate operational, structural, and nonstructural alternatives as potential solutions to perceived impacts on those resources. The end result will be a decision by the Secretary on the future operation of the dam.

Public Involvement

This document represents the first initiative in the formal public involvement process. It is intended to provide the public basic information to assist in identifying concerns, and to assist Reclamation in its scoping of the GCD-EIS. The times, dates, and places for the scoping sessions are as follows:

- * **Salt Lake City, Utah** - March 12, 1990, at 7 p.m. at the Salt Lake Hilton Hotel, 150 West 500 South, Salt Lake City, Utah
- * **Denver, Colorado** - March 13, 1990, at 7 p.m. at the Denver Sheraton Airport Hotel, 3535 Quebec Street, Denver, Colorado
- * **Phoenix, Arizona** - March 15, 1990, at 7 p.m. at the Sheraton Phoenix Hotel, 111 North Central Avenue, Phoenix, Arizona
- * **Flagstaff, Arizona** - March 16, 1990, at 7 p.m. at the City Council Chambers, 211 West Aspen Street, Flagstaff, Arizona
- * **Los Angeles, California** - March 20, 1990, at 7:30 p.m. at the Airport Marina Hotel, 8601 Lincoln Blvd., Los Angeles, California

- * **San Francisco, California** -March 21, 1990, at 7 p.m. at the Fort Mason Conference Center, Landmark Building A, Laguna and Marina Blvd., San Francisco, California
- * **Washington, DC.** -March 27, 1990, at 9:30 a.m. at the Interior South Building Auditorium, 1951 Constitution Avenue N.W., Washington, DC.

In these scoping sessions, Reclamation will receive public input on concerns and actions that the public wishes to have evaluated. Simultaneously, Reclamation will receive written comments from the public until April 16, 1990. Comments received, both verbal and written, will be used to develop a set of alternatives which seem to best represent the range of suggested actions to be considered. Additional public involvement will take place to present this range of alternatives for consideration and validation, leading to the development of a draft GCD-EIS.

PROGRAM ORGANIZATION

As lead agency, Reclamation is responsible for the overall development, conduct, and coordination of the GCD-EIS program. The Upper Colorado Regional Office of Reclamation is designated as the lead coordinating office for the GCD-EIS process. Cooperating bureaus and agencies include the National Park Service, the U.S. Fish and Wildlife Service, and the Department of Energy, Western Area Power Administration. The Bureau of Indian Affairs may also participate in the development of the GCD-EIS.

That coordination will include completion of both the technical and administrative components of the GCD-EIS process. The cooperating bureaus and agencies will supply the necessary technical and administrative assistance. The GCD-EIS will use the scientific information generated by the Glen Canyon Environmental Studies (GCES) as the basis for the technical impact assessments.

GCES is a multi-agency technical effort which began in 1982 to determine if the current operation of Glen Canyon Dam is having an impact on the Grand Canyon. GCES is an outgrowth of the

uprating and rewinding program for the operation of Glen Canyon Dam Powerplant. The study was to lead to a decision by the Secretary of the Interior as to whether impacts warranted changes in operation and, if so, begin the NEPA process.

The Secretary's decision to prepare the GCD-EIS was an acceleration of that process. GCES work will continue and the technical information generated will be carried into the GCD-EIS.

STUDY AREA AND BOUNDARIES

Physical Study Area

The primary study area for the GCD-EIS is defined as extending downstream from Glen Canyon Dam to Separation Rapids near the upper end of Lake Mead. This includes the following jurisdictional concerns:

Glen Canyon Dam and Powerplant - Bureau of Reclamation

Glen Canyon National Recreation Area - National Park Service (first 16 miles of the river from the dam to Lee Ferry)

Grand Canyon National Park - National Park Service (Lee Ferry to Separation Rapids - 270 miles)

The study lands are all under the jurisdiction of Department of the Interior bureaus, including the Bureau of Reclamation, the National Park Service, and the Bureau of Indian Affairs. Indian lands include parts of the Navajo, Havasupai, and Hualapai reservations.

Boundaries of the Environmental Impact Statement

The primary objective of the GCD-EIS is to determine specific options to the operation of Glen Canyon Dam as well as structural and nonstructural measures that could be implemented to minimize, consistent with law, the impact of the operation of Glen Canyon Dam on the downstream environmental and ecological resources.

In addition to the original work of the GCES, future work will take into account potential impacts on fish and wildlife resources including endangered species, recreational resources, cultural resources, and the other significant resources in the Grand Canyon.

Under the GCD-EIS consideration is not given to the implications of modification of Glen Canyon Dam operation on the lake levels of Lake Powell and Lake Mead. Such effects are the result of operations to meet compact deliveries and are not included in this evaluation process.

GLEN CANYON DAM OPERATIONS

Management Guidelines

Glen Canyon Dam and Powerplant were authorized for construction by Congress in 1956 by the Colorado River Storage Project Act (CRSP), Public Law 84-485. The Act was passed primarily to provide the means of meeting water deliveries under interstate compact to the Lower Basin, while at the same time, allowing development of water resources in the Upper Basin to proceed. In association with Glen Canyon Dam, five other dams were authorized and eventually built as initial units of the CRSP

mainstem system. In addition, 17 participating projects were authorized for construction.

As defined in the CRSP legislation, the purpose of the dams was stated:

For the purposes, among others, of regulating the flow of the Colorado River, storing water for beneficial consumptive use, making it possible for the States of the Upper Basin to utilize, consistently with the provisions of the Colorado River Compact, the apportionments made to and among them in the Colorado River Compact and the Upper Colorado River Basin Compact, respectively, providing for the reclamation of arid and semiarid land, for the control of floods, and for the generation of hydroelectric power, as an incident of the foregoing purposes, the Secretary of the Interior is hereby authorized (1) to construct, operate, and maintain the following initial units of the Colorado River Storage Project, consisting of dams, reservoirs, powerplants, transmission facilities and appurtenant works. . . .

The actual operation of Glen Canyon Dam is controlled by the limiting physical parameters of reservoir size, annual runoff, and discharge capacity, as well as the legislation and institutional constraints specified in the various Federal laws, interstate compacts, international treaties and Supreme Court decisions that collectively make up

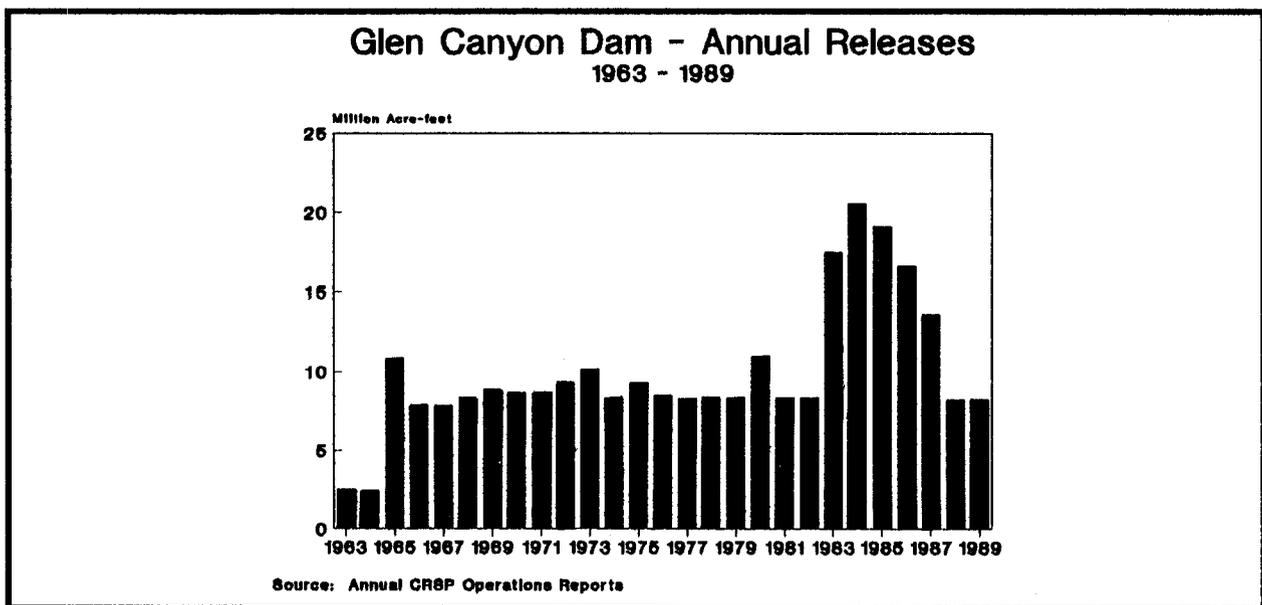


Figure 1

the body of law referred to as "The Law of the River."

To date, the operation of Glen Canyon Dam has been subject to several transition phases. Figure 1 depicts the annual volumes released for the period of record. The initial years of operation were shaped by the Filling Criteria of the dam which were specified in the 1962 General Principles to Govern and Operating Criteria for Glen Canyon Reservoir (Lake Powell) and Lake Mead during the Lake Powell Filling Period. The intent of the filling criteria was to: (1) provide for sufficient water for downstream requirements; (2) make fair allowances for any deficiency in energy generation at Hoover Dam due to the impoundment of water behind Glen Canyon Dam; and (3) bring the storage capacity in Lake Powell to minimum power pool at elevation 3,490 feet at the earliest feasible time. After Lake Powell filled in 1980, the Criteria were terminated and reservoir and river operations were governed by the Criteria For Coordinated Long-Range Operation of the Colorado River Reservoirs (Operating Criteria) promulgated in 1970 pursuant to Section 602(a) of the 1968 Colorado River Basin Project Act (Public Law 90-537). These Operating Criteria are to be administered consistent with applicable Federal laws, the Mexican Water Treaty, interstate compacts and decrees relating to the use of the waters of the Colorado River. The annual plan of operation for Colorado River reservoirs is to be consistent with the Operating Criteria and is to reflect appropriate consideration of the uses of the reservoirs for all purposes, "including flood control, river regulation, beneficial consumptive uses, power production, water quality control, recreation, enhancement of fish and wildlife, and other environmental factors."

The Secretary may sponsor a formal review of the Operating Criteria at least every five years, with participation by State Governors or their representatives and such other parties and agencies as the Secretary may deem appropriate.

A central portion of the original CRSP legislation was Section 5 of the Act which established the Upper Colorado River Basin Fund. Revenues collected from the operation of the storage projects and participating projects are credited to this fund.

The primary revenue source is through the sale of the electrical power generated by the project. The revenues repay the total cost of the original facilities, the operation, maintenance, and replacement of all facilities of the CRSP. In addition, they pay the costs allocated to irrigation beyond the irrigators ability to pay on participating projects. Other revenues are derived from transmission services, rental of facilities, reimbursement from the Boulder Canyon Project, and other miscellaneous revenues.

The Colorado River Basin Project Act (1968), which established the Operating Criteria, also contained a declaration of purpose and policy "...to provide a program for the further development of the water resources of the Colorado River Basin. . . ." The Act continues by stating, "This program is declared to be for the purposes, among others, of regulating the flow of the Colorado River; controlling floods; improving navigation; providing for the storage and delivery of the waters of the Colorado River for reclamation of lands, including supplemental water supplies, and for municipal, industrial, and other beneficial purposes; improving water quality, providing for basic public outdoor recreation facilities; improving conditions for fish and wildlife, and the generation and sale of electrical power as an incident of the foregoing purposes."

Historic Operations of Glen Canyon Dam

The filling of Lake Powell and subsequent water release management of Glen Canyon Dam have had an impact on the flows of the Colorado River through the Grand Canyon. The river flow records, maintained at Lee Ferry, can be divided into three distinct transition phases:

- * Phase I Pre-dam, 1922-1962
- * Phase II Lake Powell filling, 1963-1980
- * Phase III Lake Powell post-filling, 1981 to present.

Phase I. Pre-Dam, 1922-1962. The pre-dam period was characterized by frequent very high flows in the late spring and early summer seasons and very low flows during the late summer, fall, and winter seasons. Mean daily flows in excess of

80,000 cubic feet per second (cfs) were not uncommon and were occasionally higher than 100,000 cfs. Flows greater than 30,000 cfs occurred 18 percent of the time and flows less than 5,000 cfs occurred about 20 percent of the time. Flows less than 3,000 cfs were common during the fall and winter months.

Phase II. Lake Powell filling, 1963-1980. Lake Powell began storing water in March 1963 and was filled in June 1980. Very little water was released through the dam for the first two years of filling (about 2.5 maf per year). In 1964, Lake Powell achieved the minimum elevation necessary for production of power (3,490 feet). However, during this initial filling of Lake Powell, the elevation of Lake Mead dropped below the ideal power elevation of 1,123 feet. Therefore, during 1965 nearly 11 million acre-feet of water was released through Glen Canyon Dam to restore Lake Mead to the desired power producing level. After 1964 the Filling Criteria and the Operating Criteria overlapped in time and allowed for the annual equalization of reservoir levels of Lake Powell and Lake Mead.

The range of Grand Canyon river flows varied during the filling period but was much reduced from the pre-dam period. Flows greater than powerplant capacity of approximately 30,000 cfs were very seldom released and flows less than 5,000 cfs occurred only 20 percent of the time.

Phase III. Lake Powell, post-filling, 1981 to present. Upon filling in 1980, Lake Powell was managed to meet the downstream minimum objective water delivery requirements of 8.23 million acre-feet, and river regulation needs. The post-filling period can itself be divided into two distinct periods: (1) 1981-1986 in which the four highest consecutive years of record occurred because of abnormally high inflows to Lake Powell; and (2) 1987 to the present where we have returned to a minimum objective release program (8.23 maf).

Decision Making in the Operation of Glen Canyon Dam

Flows through the Grand Canyon, controlled by Reclamation, are influenced by storage and release

decisions that are made and scheduled annually, monthly, and hourly. The annual decisions are guided by the Operating Criteria, and other "Law of the River" mandates. The monthly releases are intermediate operational decisions needed to coordinate the operation of the Colorado River system and to systematically achieve the annual requirements. These are changed as required to accommodate forecast conditions. The hourly schedules are developed to meet the monthly target volumes, but are heavily influenced by both hourly power demands and minimum release criteria.

Current minimum release criteria established by Reclamation and Western Area Power Administration (Western) are 1,000 cfs for the period of Labor Day to Easter and 3,000 cfs for the period of Easter through Labor Day (the recreation season).

Reclamation sets the annual and monthly flow schedules based on the legal downstream requirements, the available storage in Lake Mead, Lake Powell, and other upstream reservoirs, and the forecasted amount of runoff into the Colorado River system. This planning of releases is done for each Federally controlled mainstem reservoir in the Colorado River Basin and the result is an Annual Operating Plan for the Colorado River reservoir system. The Annual Operating Plan and monthly schedules are developed in consultation with the seven Colorado River Basin States. The operation of the Colorado River is to be consistent with the Operating Criteria and is to reflect flood control, river regulation, beneficial consumptive uses, hydroelectric power generation, water quality control, enhancement of fish and wildlife, recreation, and other environmental factors. The Operating Criteria is administered consistent with applicable Federal laws, the Mexican Water Treaty, interstate compacts, and decrees relating to the use of the waters of the Colorado River.

Western utilizes the monthly flow release information and schedules the daily and hourly flow releases based on electrical demands, availability of water, purchase power availability, costs, transmission system constraints, anticipated maintenance needs and any power system

emergencies that may arise. The maximum release is presently limited to 31,500 cfs.

The following guidelines are followed to the extent possible within higher priority operating constraints, in producing hydroelectric power: (1) bypasses of powerplants are minimized, and to the extent possible, eliminated; (2) water releases are maximized during the peak energy demand periods, generally Monday through Saturday between 7 a.m. and 11 p.m.; and (3) water releases are maximized during months of peak energy demand and are minimized during low demand months.

The initial power marketing plan for the CRSP was developed in 1961. A public participation process assessed interest in the power and developed long-term firm power contracts for the future energy and capacity to be produced by the CRSP powerplants, including Glen Canyon Dam. Firm power is non-interruptible power which is guaranteed by the supplier to be available at all times except for reasons of certain uncontrollable forces or continuity of service provisions.

In 1962, the Secretary of the Interior issued the General Power Marketing Criteria for the CRSP program which identified the market area, the service seasons, the basis of allotments, priority,

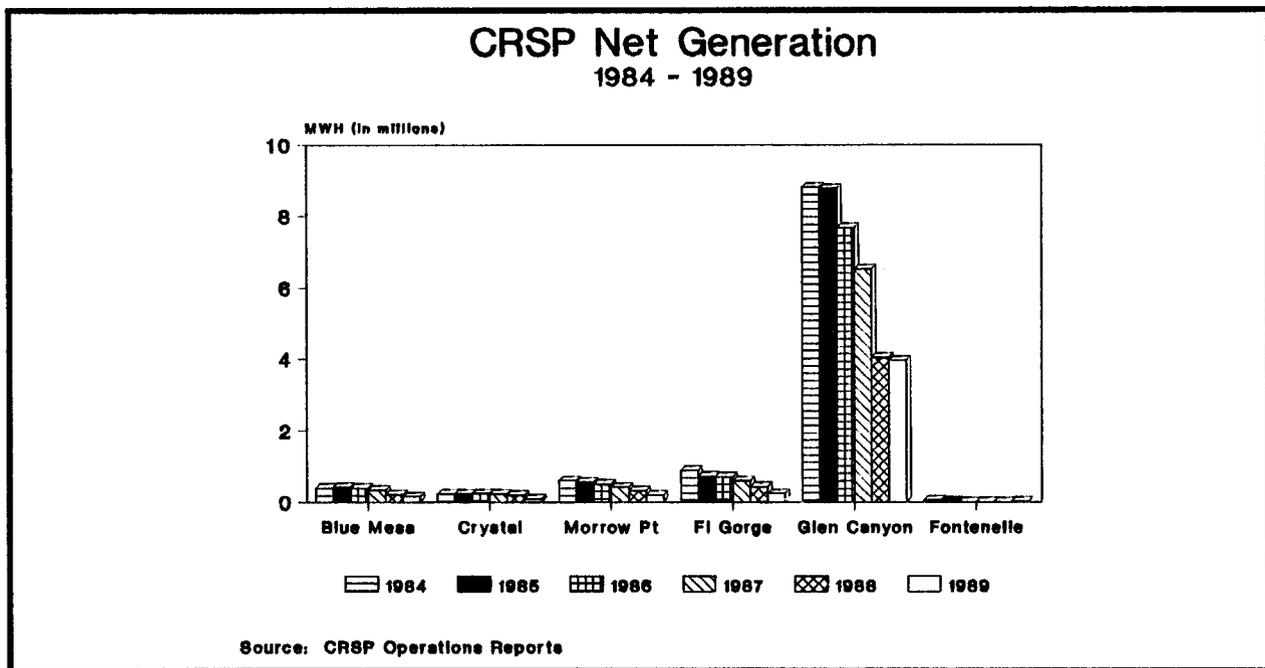


Figure 2

Power Marketing and the CRSP

Public Law 84-485 provides for the development and marketing of power from the mainstem reservoirs. Section 7 of the Act provides, "The hydroelectric powerplants and transmission lines authorized by this Act to be constructed, operated, and maintained by the Secretary 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. . . ."

the basis for the firm power supply, energy limitations, delivery conditions, and points of delivery for the Federal power. These marketing criteria have been revised a number of times, most recently in the development of Western's post-1989 marketing criteria.

In 1977, the Department of Energy was formed (Public Law 95-91) and all of the power marketing responsibilities were transferred from Reclamation to the newly created Western Area Power Administration. Western operates and maintains the transmission lines and substations

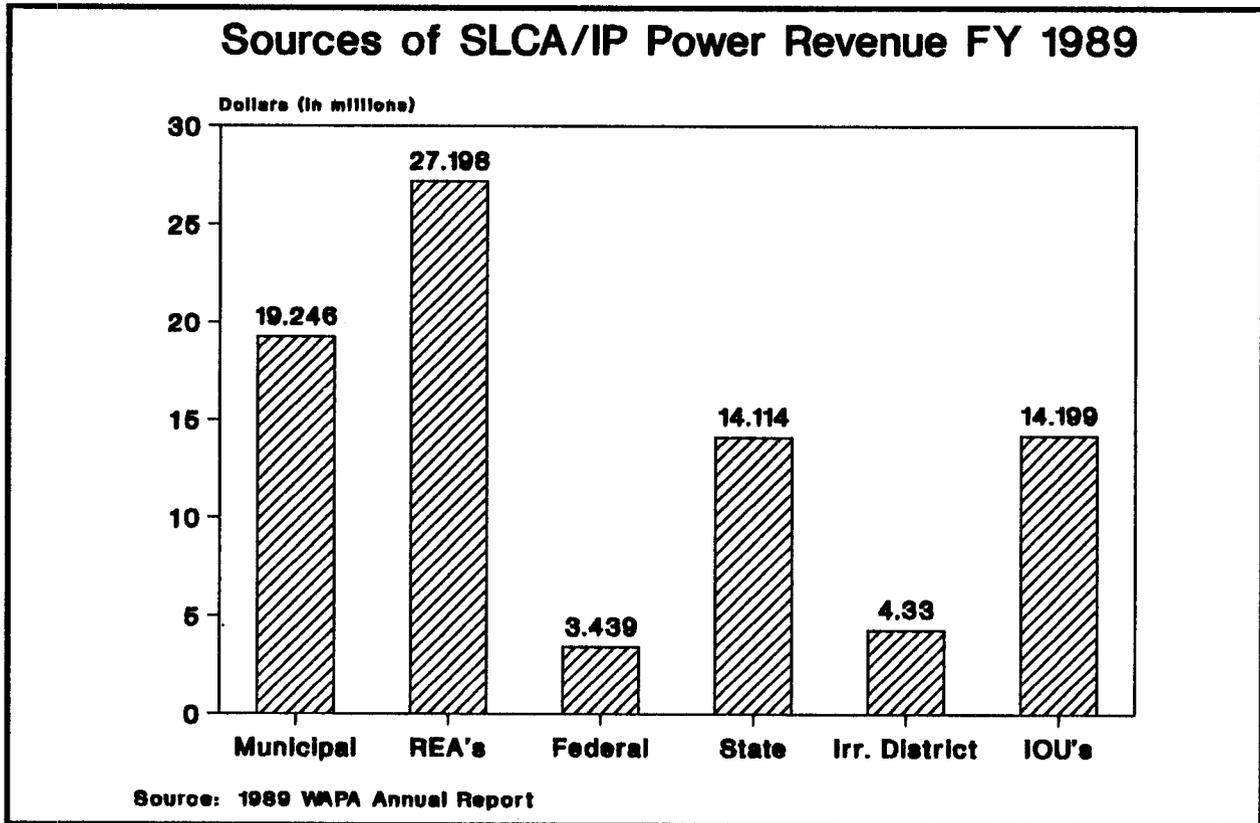


Figure 3

which transmit the power generated by the CRSP powerplants. Figure 2 identifies the CRSP generation supplied by the six CRSP powerplants for the period 1984 to 1989.

Western markets the power generated from the CRSP mostly within a six-state area that includes Wyoming, Utah, Colorado, Nevada, New Mexico, and Arizona. Marketing of the Federal power is governed by several statutory criteria, including: (1) preference in the sale of power must go to municipalities, public corporations, cooperatives, and nonprofit organizations; (2) revenues generated from the sale of power must be adequate to pay for the total costs of generating the power and all investment costs allocated to be repaid by power revenues; and (3) power must be marketed at the lowest possible rates consistent with sound business practices.

Figure 3 identifies the sources of the Salt Lake City Area/Integrated Projects (SLCA/IP) revenue for fiscal year 1989. The SLCA/IP area includes CRSP and the Rio Grande and Collbran Projects.

Of those revenues, approximately 99 percent were allocated to SLCA/IP.

Western markets the power generated from the CRSP on either a long-term firm basis or on a short-term basis through agreements with their power customers or associated utilities interconnected with the CRSP transmission system.

The majority of Western's customers purchase power from the CRSP to complement other sources of electrical generation. The management of the hydropower resources at Glen Canyon provides regulation in conjunction with other integrated resources such as CRSP generation and purchases to match the minute-by-minute changes in load requirements.

When available, the surplus hydropower resource is sold on a short-term basis to their power customers. CRSP also provides other services such as emergency services and scheduled outage assistance.

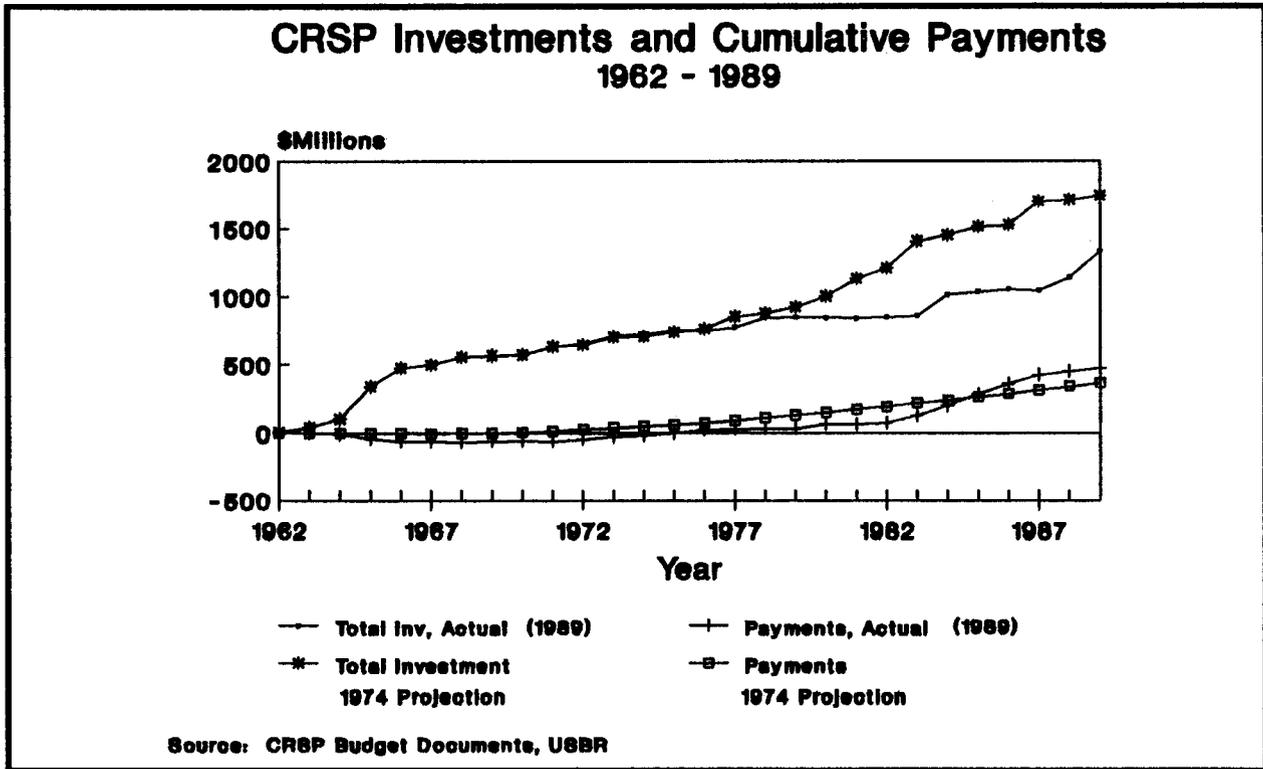


Figure 4

Power repayment studies are prepared annually to determine if rate adjustments are necessary. By law, rates for CRSP power must be set at the lowest level consistent with sound business principles that yield revenues sufficient to pay operation and maintenance expenses, Federal investment, irrigation investment beyond the ability of irrigators to pay and other costs outlined in the project enabling legislation. See Figure 4 for the current status of repayment of the CRSP investment.

The current SLCA/IP combined firm rate is 9.92 mills/kWh, which reflects a firm capacity rate of \$2.09/kW-month and a firm energy rate of 5.00 mills/kWh. A mill equals one-tenth (1/10) of a cent (\$.001). This composite rate is the fifth CRSP firm rate in place since the initial CRSP power facilities were completed. A 46 percent rate increase is currently proposed for the SLCA/IP.

ISSUES OF CONCERN

Concerns for Downstream Natural and Recreational Resources.

The primary areas of concern identified by the GCES program focused on four areas: (1) the aquatic environment; (2) the sediment and beaches; (3) the recreation uses; and (4) the Grand Canyon ecosystem.

Aquatic Environment

The closure of Glen Canyon Dam altered the character of the water released through the Grand Canyon. The principal characteristics changed were the sediment, the temperature of the water, and the nutrient dynamics. The water released changed from seasonally warm and turbid to clear and cold, which is highly conducive to the establishment of a trout fishery. However, while an environment favorable to trout was created, the historic habitat of the native and endangered fish species of the Grand Canyon was substantially

impacted. The warm backwaters and turbid cover were destroyed and consequently the remaining populations of the native fish had to adapt. Those that could not perished or left the canyon. Today, only one of the four threatened and endangered species present in the Grand Canyon prior to Glen Canyon Dam remains. The change in their historic habitat and invasion of predator species makes for a limited future for native fish species. As a result of the creation of a habitat that could produce a trout fishery, Arizona Game and Fish Department, through planting and management, has established a world class trout fishery. This fishery occurs mainly between the dam and Lee Ferry. Trout reproduction is limited as a result of fish moving into spawning areas at high flows and becoming stranded as the flows are reduced. The fluctuating flows also impact eggs laid in the gravels and the aquatic food base developed on the substrate. These concerns have been expressed by the public utilizing the fishery for sport and/or business purposes.

Sediment and Beaches

Prior to the closure of Glen Canyon Dam, the annual rise and fall of the river levels systematically eroded and rebuilt the beaches and sediment deposits of the Grand Canyon. With the closure of Glen Canyon Dam, the primary source of sediment to the Grand Canyon was lost. Today, approximately 13 percent of the sediment previously supplied to the Grand Canyon is available. The majority of that comes from the Little Colorado River (LCR) and other tributary drainages during the spring runoff and periods of intense summer thunderstorms.

During the filling period 1963-1980, when releases were limited to 8.23 maf/per year, the LCR and tributary inflow of sediment still exceeded outflow from the canyon, and storage of sediments in the canyon occurred. During this period of time, an "equilibrium" of sorts was established reflecting Glen Canyon Dam releases (8.23 maf/per year) and powerplant peaking operations. During the high flow years of 1983-1985, this equilibrium was temporarily upset resulting in many changes. In some cases, beaches were destroyed; in other cases, beaches were created. This system, however, is now in transition

and is seeking to achieve some level of equilibrium.

Recreation Uses

Prior to the closure of Glen Canyon Dam, little water-borne recreation took place in the Colorado River. Glen Canyon Dam greatly expanded three recreation opportunities: the trout fishery; the day-use rafting from the Dam to Lee Ferry; and the whitewater rafting industry in the Grand Canyon.

The trout fishery use began prior to the day-use rafting, largely in response to the tremendous growth of the fish and the fishing opportunities presented in the Lee Ferry area fishery. With the stocking of trout and the expansion of the fishery came a large increase in fishing use. Problems today focus on the low water access to the fishery and safety problems associated with rapidly varying flows.

The whitewater rafting industry has expanded in recent years. The National Park Service regulates the number of commercial and private people who can use the Grand Canyon in any one year. Approximately 22,000 park visitors annually raft the river at this time. Problems associated with operational impacts center in two areas: safety problems at low flows; and congestion problems at low water. Low water often limits the distance that boats can travel in a day and the rapids they can run. Congestion at the major rapids can lead to problems finding adequate camping beaches downstream and impacts on the overall Grand Canyon ecosystem.

Grand Canyon Ecosystem

The overall condition of the Grand Canyon ecosystem is impacted by the levels of the river. With limited resupply of sediment, beaches and sediment deposits, once eroded away, have little opportunity to reestablish themselves. As the sediment deposits erode away, increasing amounts of Indian cultural resources are being exposed to erosion.

Riparian plant communities which have established themselves along the river corridor, as a result of post-dam controlled flow conditions, are periodically being eroded away. As the

vegetation population fluctuates, the habitat for the birds, reptiles, and insects is also impacted. The in-river sediment deposits also form the basis for the aquatic micro-habitat zones needed by the larval and juvenile fish, and several species of waterfowl, and mammals.

Concerns of Water Interests

The delivery of water downstream is a legally mandated requirement that the Secretary of the Interior must meet. The water that travels through the Grand Canyon goes on to serve millions of people in Arizona, Nevada, California, and Mexico. In order to meet legal obligations, the water must be delivered. Glen Canyon Dam and Reservoir provide for the regulation of the river to ensure these deliveries, while at the same time allowing for the utilization of Upper Basin water rights provided for in the Colorado River Compact of 1922 and the Upper Colorado River Basin Compact of 1948.

Concerns of Power Interests

The SLCA/IP power customers have developed their power supply arrangements based on defined contractual obligations. Modifications of the amount of electricity available would require finding alternate and more expensive power. The power users would be affected by changes in the amount of both long-term firm and short-term firm, non-firm power, the availability of these power supplies, and the price for each of these resources.

Preliminary Indication of Studies to Date

Information from the Glen Canyon Environmental Studies to date enables Reclamation to discuss the approximate relationships between the various resources within the study area and the flow conditions which might exist in the Grand Canyon. The following discussion is intended only for the purpose of aiding in understanding the potential interrelationships between the key resources and river flow. Once the initial scoping process is complete, Reclamation will begin the task of

formulating the alternatives to be fully evaluated in the Draft GCD-EIS. This preliminary discussion is provided to give the public the benefit of knowledge gained in the GCES studies to date so that a better understanding can become the foundation of the public input on the kinds of alternatives which should be formulated for the GCD-EIS. The degree of impact to each resource or its relative value have not been thoroughly addressed here, only the relationships. Detailed evaluations and assessments will be presented in the Draft GCD-EIS.

As discussed previously in this section, there are a number of issues of concern which have been identified in the GCES thus far. These concerns can be characterized into the following categories: 1) aquatic environment; 2) sediment and beaches; 3) recreation use; and 4) Grand Canyon ecosystem. In addition, two other issues must be considered when identifying the interrelationships. They are 5) water conservation and 6) power production and cost.

The following discussion illustrates the relative changes in all other concerns when any single concern is given priority. This discussion should help the public determine the direction and relative magnitude of any changes to be evaluated as a part of the GCD-EIS process.

In no particular order here are the discussions of the interrelationships:

Grand Canyon Ecosystem

In order to give priority to this concern, steady flows, on a monthly basis, would be desirable. This would allow the existing sediment deposits (many of which are used as camping beaches) to be preserved or maintained for as long as possible. This in turn would preserve substrate for vegetation; terrestrial wildlife would be expected to respond positively as well. The trout reproduction in the study area would be improved. The effects of steady flow would be expected to maintain and/or improve habitat for endangered species. Both fishing access and whitewater rafting would be improved. There would be no impact on water conservation; however, river regulation and coordination of reservoir operations could be effected. Both the power

capacity and its marketability would be reduced and the resultant cost of power would increase.

Power Production and Cost

In order to give priority to this concern, a maximizing of the amount and marketability of the power is desired. This would allow the power to be marketed at the lowest possible rate. Flows would fluctuate as much as possible. If this concern is given priority, trout spawning success would be reduced and increased stranding would occur. Endangered species habitat could be further impacted. Beach erosion may be accelerated. Fishing access would be reduced and whitewater rafting quality would decrease through increased clustering and decreased safety. The ecosystem would experience degradation and lack stability. There would be no impact on water conservation; however, river regulation and coordination of reservoir operations could be effected.

Aquatic Environment

To give priority to the aquatic environment all fish species, (trout, endangered humpback chub, and other native fish) and other affected wildlife must be considered. Increasing flow minimums would benefit trout. High flows in the spring would be expected to improve habitat for humpback chubs. There may be an offsetting relationship where benefit to one species causes reduction in benefit to the other.

An increase in minimum flows for trout would reduce beach erosion. The ecosystem would improve in stability. Power capacity would decline and the resulting power cost would be higher. Fishing access would improve and the quality of the whitewater boating experience would improve. Beach stability would improve. There would be no impact on water conservation; however, river regulation and coordination of reservoir operations could be effected. An increase in spring high flows for the endangered species may have negative effects on all other concerns.

Sediment and Beaches

In order to give priority to this concern, flows should remain as stable as possible. This would allow the existing beaches to be maintained as long as possible. If this concern is given priority, trout

reproduction would be improved. The effects of the steady flows on endangered fish is unknown. Both fishing access and whitewater rafting would be improved. There would be no impact on water conservation; however, river regulation and coordination of reservoir operations could be effected. Both the amount and marketability of the power would be reduced and the cost of power would increase. This priority is similar in objective and resulting relationships to the priority for the ecosystem.

Water Conservation

In order to give priority to this concern, the primary requirement is that the monthly volumes of water, as prescribed in the relative compacts, regulations and criteria, be moved through the system. A good deal of flexibility exists in the timing and rates of those deliveries. It appears that other concerns can be accommodated within the boundaries of providing this priority for water conservation. Only in those instances when a prescribed monthly volume cannot physically be delivered in accord with the needs of any other concern (such as a minimum flow that is too low or a steady flow that is too high) would meeting this priority create an undesirable effect on other concerns. The known potential conflicts would be limited to the potential of very high flows for spring months for endangered fish or low steady flows for extended periods of time.

Recreation Use

In order to give priority to this concern the reduction of rafting hazards and delays as well as the improvement of fishing access are desired. An increase in the minimum flow would accomplish this priority. If this concern is given priority, trout reproduction would be improved. Affects on endangered species may be improved. Beach stability would be somewhat improved. There would be no impact on water conservation; however, river regulation and coordination of reservoir operations could be effected. The availability and marketability of power would be reduced and the resultant cost would increase.

SUMMARY AND CONCLUSION

Through the public scoping process, Reclamation seeks your input on the number and kinds of alternatives that should be evaluated during the process. If Reclamation, with public input, properly scopes the GCD-EIS process, the resultant decision of the Secretary will be made with all the available information clearly and fairly presented.

Reclamation's additional public involvement will present those alternatives which were determined to be most appropriate for final evaluation. Following this review, Reclamation will initiate preparation of a Draft GCD-EIS. Reclamation's Draft GCD-EIS will present to the public an analysis and evaluation of each of those alternatives against the affected environment. Public comments on that Draft GCD-EIS (along with Reclamation's responses to comments and any modifications made to the GCD-EIS) will lead to a Final GCD-EIS. This Final GCD-EIS will be the basis of the Secretary's decision. Reclamation believes that each step in this process is critical to arriving at the correct decision.

The information provided in this paper is not comprehensive. Rather, the information presented here is meant to provide background that defines the Colorado River Storage Project and helps the public participate more effectively on the GCD-EIS.

Other documents that may be useful will be defined in the public scoping sessions or in other public scoping documents.

It is the intent of the Department of the Interior to develop a clear, credible and open public participation process. The intent of NEPA is to provide an opportunity for public involvement in the process.

Your comments and concerns are important to us. You are encouraged to send your comments to the following address:

Glen Canyon Dam - Environmental Impact
Statement
U.S. Bureau of Reclamation
P.O. Box 11568
Salt Lake City UT 84147