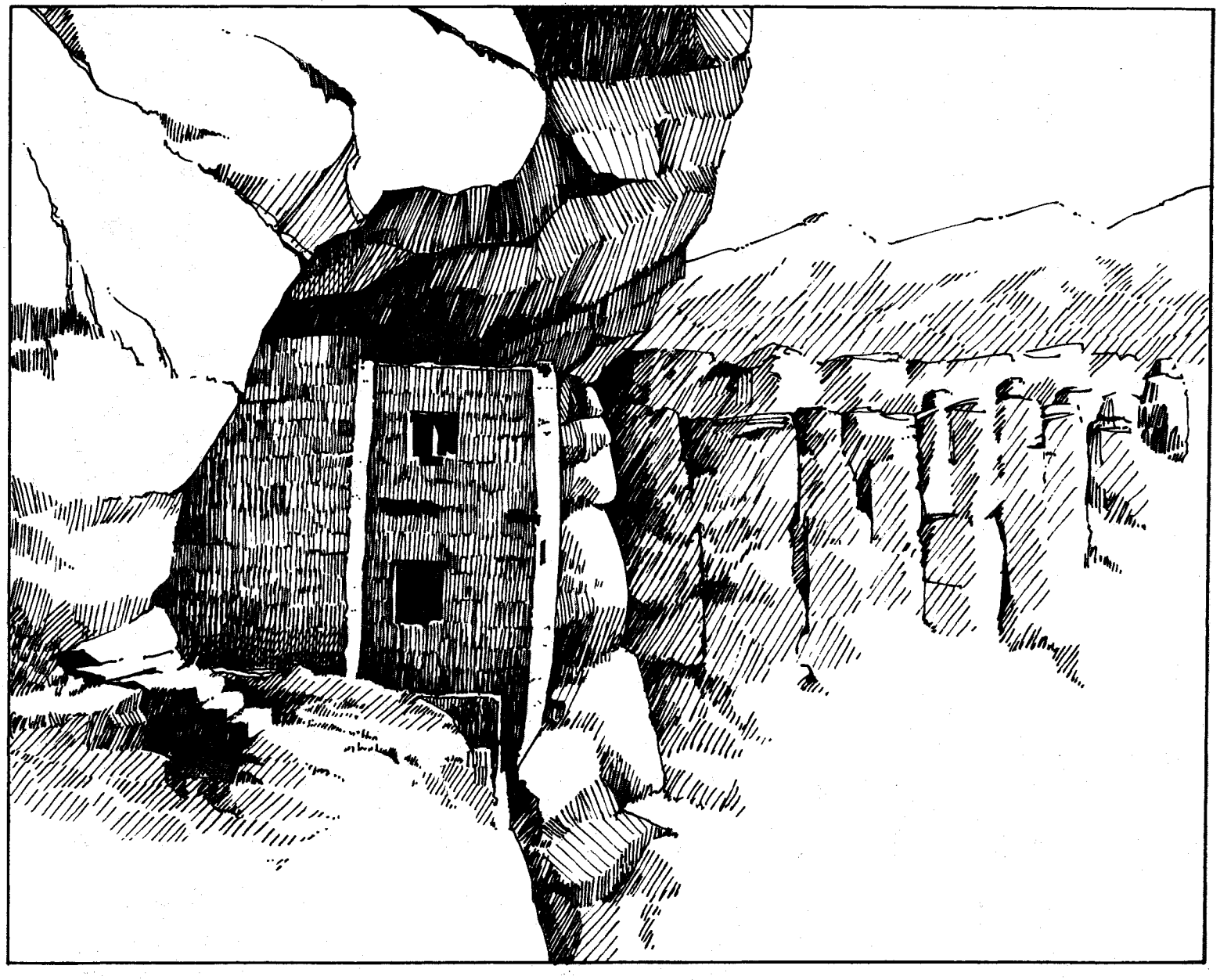
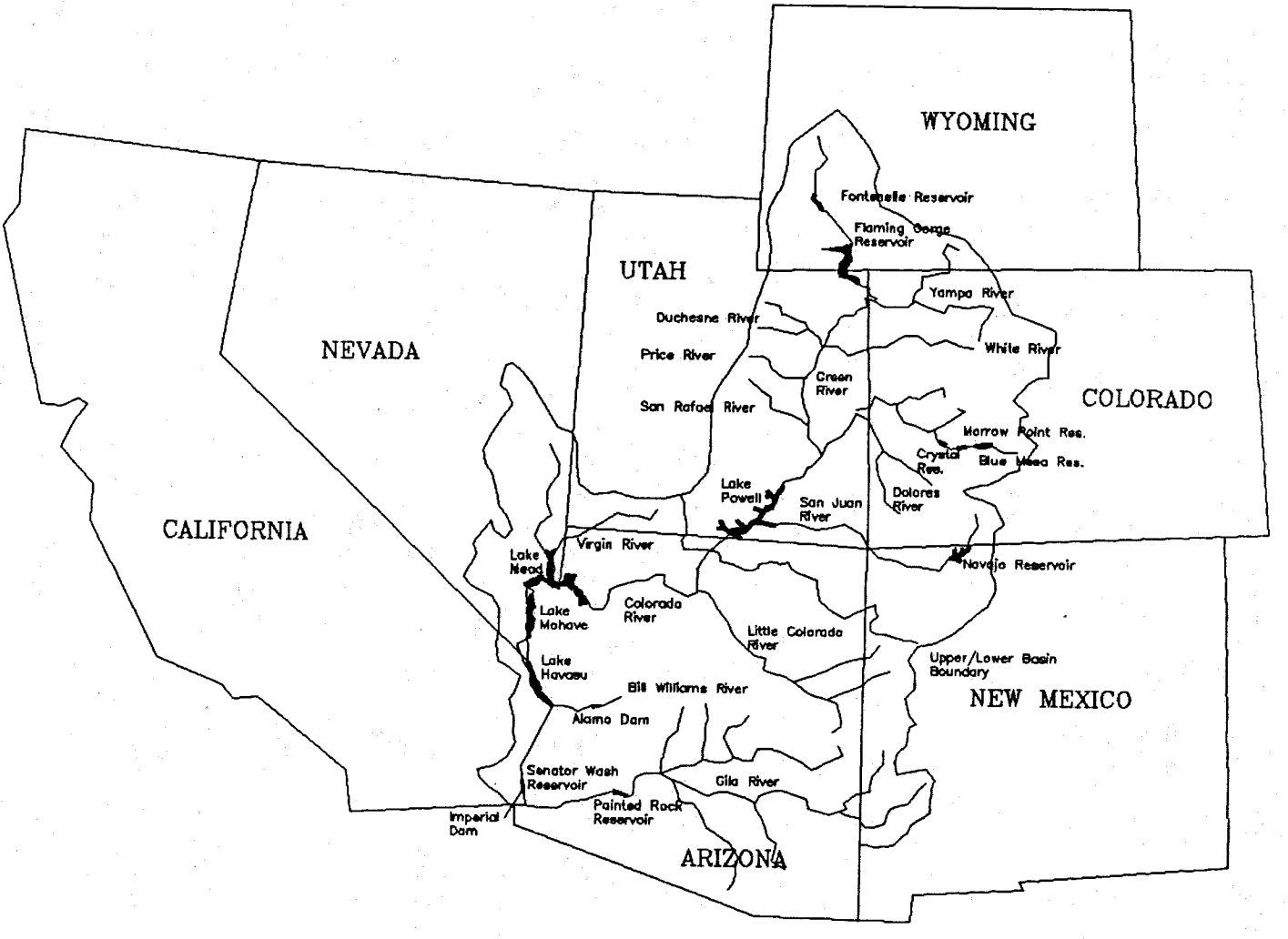
16th Annual Report

Operation of the Colorado River Basin 1986 Projected Operations 1987



Colorado River Basin



CONTENTS

United States
Department of the Interior
Bureau of Reclamation

January 1987

Prepared pursuant to the Colorado River
Basin Project Act of 1968
Public Law 90-537

Introduction

The operation of the Colorado River Basin during the past year and the projected operation for the current year reflect flood control, domestic use, irrigation, hydroelectric power generation, water quality control, fish and wildlife propagation, recreation, and Colorado River Compact requirements.

Storage and release of water from the Upper Basin reservoirs are governed by all applicable laws and agreements concerning the Colorado River, including the impoundment and release of water in the Upper Basin required by Section 602(a) of the Colorado River Basin Project Act of September 30, 1968 (Public Law 90-537). The operation of the Lower Basin reservoirs reflects Mexican Treaty obligations and Lower Basin contractual commitments.

Nothing in this report is intended to interpret the provisions of the Colorado River Compact (45 Stat. 1057), the Upper Colorado River Basin Compact (63 Stat. 31), the Water Treaty of 1944 with the United Mexican States (Treaty Series 994, 59 Stat. 1219), the Decree entered by the Supreme Court of the United States in Arizona v. California et al. (376 U.S. 340), the Boulder Canyon Project Act (45 Stat. 1057), the Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S.C. 618a), the Colorado River Storage Project Act (70 Stat. 105; 43 U.S.C. 620), the Colorado River Basin Project Act (82 Stat. 885; 43 U.S.C. 1501), or the Hoover Power Plant Act of 1984 (98 Stat. 1333).

Authority for Report

Pursuant to the Colorado River Basin Project Act (Public Law 90-537) of 1968, I am pleased to present to the Congress, and to the Governors of the Colorado River Basin States, the sixteenth annual report on the Operation of the Colorado River Basin.

This report describes the actual operation of the reservoirs in the Colorado River drainage area constructed under the authority of the Colorado River Storage Project Act, the Boulder Canyon Project Act, and the Boulder Canyon Project Adjustment Act during water year 1986 and the projected operation of these reservoirs during water year 1987 under the "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs," published in the Federal Register June 10, 1970.

Donald Paul Hodel, Secretary
United States Department of the Interior

Actual Operations Under Criteria - Water Year 1986

The initial plan of operation for water year ending September 30, 1986, based on forecasted inflow conditions for October through January and average inflow conditions through the rest of the water year 1986 called for scheduled releases from Lake Powell of 11.5 million acre-feet (MAF). This plan of operation would have created 6.7 MAF of vacant space in the Colorado River reservoir system by the end of September 1986, of which 1.8 MAF would have been in Lake Powell. With this plan of operation the contents of Lakes Powell and Mead would have been within 3,000 acre-feet of each other at the end of September 1986.

The April through July forecast of runoff made on January 1, 1986, was 10.6 MAF or 130 percent of the long term average. This long term average is calculated by the Bureau of Reclamation using 80 years of natural flow data (1906-1985) and current depletion levels. Accordingly, releases from Glen Canyon powerplant were maintained at 20,000 cubic feet per second (cfs) January and February. The April-July forecast increased slightly in March, up to 135 percent of average. In response to this higher forecast, powerplant releases increased to 90 percent of capacity during March and April. A cold, wet April provided an increase to the snowpack, so by the first of May the runoff forecast had increased up to 12.6 MAF or 154 percent of the long term average. As a result, the releases from Glen Canyon were increased to 100 percent of capacity for both the powerplant and river outlet works. Reservoir inflows remained above average during May, and in conjunction with a wet weather pattern, caused an early melt of lower elevation snow. This caused the inflow to Lake Powell to rise to 61,400 cfs in early May.

With warmer temperatures, a snowmelt runoff peak of 110,400 cfs unregulated flow was observed on June 9, 1986. Unregulated runoff is the inflow to Lake Powell adjusted for the change in storage of the upstream reservoirs discussed in this report. Corresponding with the passing of the peak inflow, the river outlet works at Glen Canyon were closed while the powerplant remained at maximum releases through the end of the month. The actual unregulated April-July runoff into Lake Powell was 12.5 MAF in 1986, or 153 percent of average, and Lake Powell reached its maximum elevation of 3,700.02 feet on July 27.

The total unregulated runoff for water year 1986 at Lake Powell was 18.2 MAF or 152 percent of the long-term average. Water supply for the San Juan River above Navajo Dam and the mainstem Colorado River above Grand Junction, Colorado, for the water year were at 169 percent, while the Gunnison River above Blue Mesa Dam was at 131 percent, and the Green River above Flaming Gorge Dam was at 184 percent of average. Total releases from Glen Canyon were 16.7 MAF, while the regulated inflow for the year was 17.8 MAF. Aggregate Colorado River storage at the end of the year was 55.7 MAF, representing an increase of 100,000 acre-feet from the previous year.

Commencing in 1986 the operation of the Colorado River Reservoir System was coordinated with Federal and State interests through the Colorado River Management Task Force. The task force is comprised of representatives from each of the seven Basin States, the Upper Colorado River Commission, International Boundary and Water Commission, Western Area Power Administration, and the Bureau of Reclamation, and was implemented by Secretary of the Interior Donald P. Hodel. It represents a comprehensive effort by the seven Colorado River Basin States and numerous Federal agencies and serves as a technical forum for resolving operational issues on the Colorado River.

Projected Plan of Operation Under Criteria - Water Year 1987

Determination of "602(a) Storage"

Section 602(a)(3) of the Colorado River Basin Project Act of September 30, 1968 (Public Law 90-537), provides for the storage of Colorado River water, not required to be released under article III(c) and III(d) of the Colorado River Compact in Upper Basin reservoirs, to the extent the Secretary of the Interior (Secretary) finds it necessary to assure Compact deliveries without impairment of annual consumptive uses in the Upper Basin.

Article II of the "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs" (Operating Criteria) provides that the annual plan of operation shall include a determination by the Secretary of the quantity of water considered necessary to be in Upper Basin storage as of September 30 of the current year.

This determination shall consider all applicable laws and relevant factors including, but not limited to the following: (a) historic streamflows; (b) the most critical period of record; (c) probabilities of water supply; (d) estimated future depletions in the Upper Basin, including the effects of recurrence of critical periods of water supply; (e) the "Report of the Committee on Probabilities and Test Studies to the Task Force on Operating Criteria for the Colorado River," dated October 30, 1969, and such additional studies as the Secretary deems necessary; and (f) the necessity to assure that Upper Basin consumptive uses are not impaired because of failure to store sufficient water to assure deliveries under section 602(a)(1) and (2) of Public Law 90-537.

Taking into consideration these relevant factors, the Secretary has determined that the active storage in Upper Basin reservoirs forecast for September 30, 1987, exceeds the "602(a) Storage" requirement under any reasonable range of assumptions which might be applied to those items previously listed. Therefore, the accumulation of "602(a) Storage" is not the criterion governing the release of water during the current year.

Mexican Treaty Obligations

Annual calendar year schedules of monthly deliveries of water in the limitrophe section of the Colorado River, allotted in accordance with the Mexican Water Treaty signed in 1944, are formulated by the Mexican Section and presented to the United States Section, International Boundary and Water Commission (Commission), before the beginning of each calendar year.

Upon 30 days advance notice to the United States Section, Mexico has the right to modify, within the total schedule, any monthly quantity prescribed by the schedule by not more than 20 percent. During water year 1986, Mexico received a total delivery of about 10,780,000 acre-feet at the Northerly International Boundary (NIB).

Of the 10,780,000 acre-feet of mainstem Colorado River water reaching the NIB, about 4,900,000 acre-feet were delivered through the Pilot Knob Powerplant and Wasteway from the All-American Canal. An estimated 5,600,000 acre-feet were released through Laguna Dam. The remainder of the flow at NIB was made up of return flows to the Colorado River below Laguna Dam and returns to the Gila River below the gaging station near Dome, as well as Gila River flood control releases from Painted Rock Reservoir.

Because of the current water supply conditions, the United States will make scheduled deliveries of 1,700,000 acre-feet of Colorado River water to the Republic of Mexico in calendar year 1987. Under most probable water supply conditions, flow at the NIB would total approximately 6.6 MAF during calendar year 1987. Such release of water is based upon average runoff conditions for the year. Should the runoff during 1987 be substantially above average, significant releases for flood control purposes could be required from Hoover Dam. Representatives of the Republic of Mexico will be kept informed of operating schedules through the United States Section of the Commission.

Projected Plan of Operation - Water Year 1987

A proposed operation plan for water year 1987 for major reservoirs of the Colorado River system was formulated and distributed to representatives of the Colorado River Basin States in November 1986. This plan was prepared in accordance with the Operating Criteria published June 4, 1970, in compliance with section 602, Public Law 90-537. The plan reflects operation for flood control, domestic and irrigation use of water, hydroelectric power generation, water quality control, fish and wildlife propagation, recreation, and Colorado River Compact requirements.

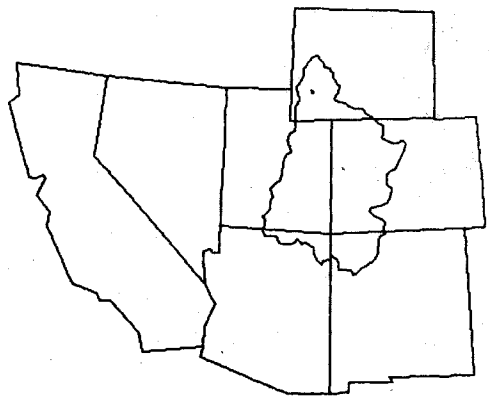
The water year 1987 plan is essentially the same as the plan developed for water year 1986. During the first three months of water year 1987, releases will be at 45 percent of powerplant capacity at Glen Canyon, then releases will increase during January 1987 in order to develop sufficient vacant reservoir space to reduce the risk of spilling. This also reduces the risk of damaging flood releases from Hoover, Davis, and Parker Dams, should large runoff forecasts occur during the 1987 runoff period. Releases from January through July will be based upon the runoff forecasts received during that time but will result in greater available space on August 1, 1987, than the minimum flood control requirement of 1.5 MAF.

The plan calls for a total Glen Canyon release in water year 1987 of 11.7 MAF under reasonable minimum inflow conditions. An annual release of 14.7 MAF would be required under most probable inflow conditions, which would fill Lake Powell and also equalize the active contents of Lake Powell and Lake Mead by September 30, 1987. With a reasonable maximum inflow during water year 1987, the projected Glen Canyon releases would be 17.6 MAF. This volume of inflow would require maximum powerplant releases during April through August, and 75 percent powerplant capacity during the remainder of water year 1987 to avoid the use of Glen Canyon's river outlet works or spillways.

The projected operation for most probable runoff conditions for the major reservoirs in the Colorado River Basin for water year 1987 is described in the following pages.

Charts showing the projected monthly outflows from each reservoir for the three assumed hydrologic conditions are presented with each reservoir operation. Each of these assumptions uses the most current hydrologic information available by including actual forecasted October through December 1986 inflows. The monthly inflows for the remainder of the year were based upon the following assumptions: (1) reasonable maximum based upon the annual volume of inflow which would be exceeded about 10 percent of the time; (2) most probable based upon the 1906 through 1983 natural flows developed for the Colorado River Simulation System (CRSS) model depleted up to current levels; and (3) reasonable minimum based upon the annual volume of inflow which would be exceeded about 90 percent of the time.

UPPER BASIN RESERVOIRS
FONTENELLE RESERVOIR
(GREEN RIVER)



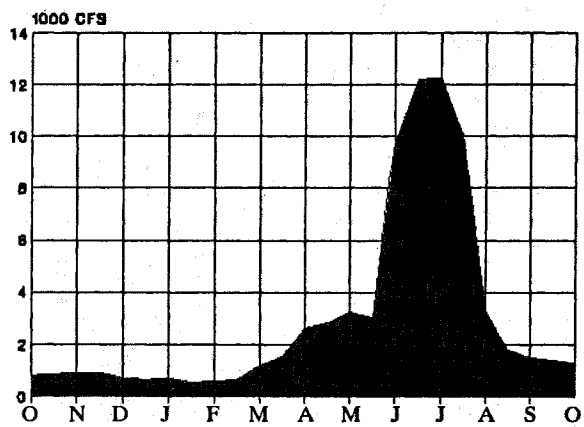
Water Year 1986

The water year 1986 plan of operation for Fontenelle Reservoir was to maintain the water surface elevation as near as possible to 6,443 feet. This elevation restriction was imposed due to ongoing modification work to correct excessive seepage from the reservoir.

The January 1, 1986, forecast of April through July runoff was 131 percent of average but by May 1, the forecasted inflow had increased to 161 percent of average. The elevation of Fontenelle Reservoir was maintained near 6,443 feet until May 31, by matching releases with inflow. The June 1, 1986, forecasted inflow had increased again, up to 1,450,000 acre-feet or 173 percent of average, and inflows increased rapidly over the next few days as the spring runoff began. On June 3-6, the rise in reservoir elevation was averaging 5 feet per day as inflow exceeded the release capacity of the outlet works. Releases started to decrease on June 8, due to large amounts of debris brought into the reservoir with the high runoff which collected around the outlet works. After temporarily shutting down releases for removal of debris from the intake structures, maximum releases of 12,500 cfs were obtained on June 18, and were sustained for the remainder of the month of June. Fontenelle Reservoir reached a peak elevation of 6,494.95 feet on June 21-22, and the peak inflow occurred on June 8, 1986, at 20,130 cfs.

The actual April through July runoff into Fontenelle Reservoir was 1,670,000 acre-feet which was 200 percent of average. Inflow for the entire water year 1986 was 2,194,000 acre-feet or 184 percent of average. The total release from Fontenelle Dam for water year 1986 was 2,186,000 acre-feet. Since the reservoir level was below the minimum power elevation for most of the year, the powerplant at Fontenelle was not used during water year 1986.

ACTUAL RELEASES WY 1986



FONTENELLE RESERVOIR

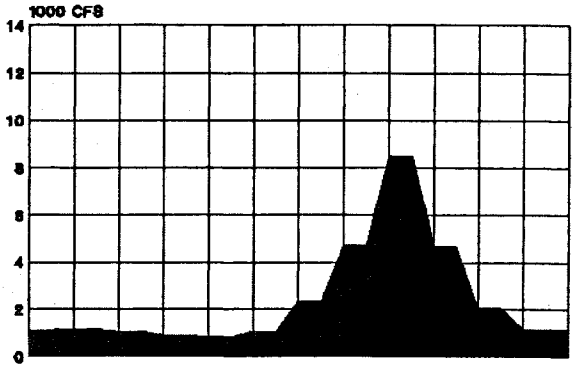
Reservoir	Acre-feet	Elevation, feet
Maximum Storage	344,834	6,506
Rated Head	233,789	6,491
Minimum Power	194,962	6,485
Surface Area, full		8,058 Acres
Reservoir Length, full		18 Miles

Powerplant	
Number of Units	1
Total Capacity	10,000 KW

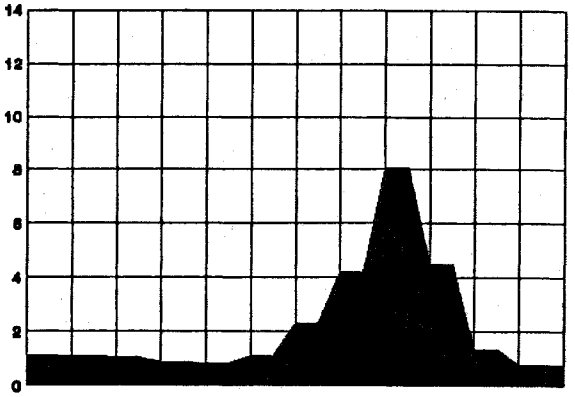
Water Year 1987

The projected plan of operation for Fontenelle Reservoir for water year 1987 is essentially the same as for water year 1986. Due to the construction modification activities involving the installation of a diaphragm wall located along the centerline axis of the dam, the reservoir elevation will be maintained at elevation 6443 feet. Based on the reasonable maximum and minimum inflow operation studies, releases are expected to stay between 400 and 10,000 cfs throughout water year 1987.

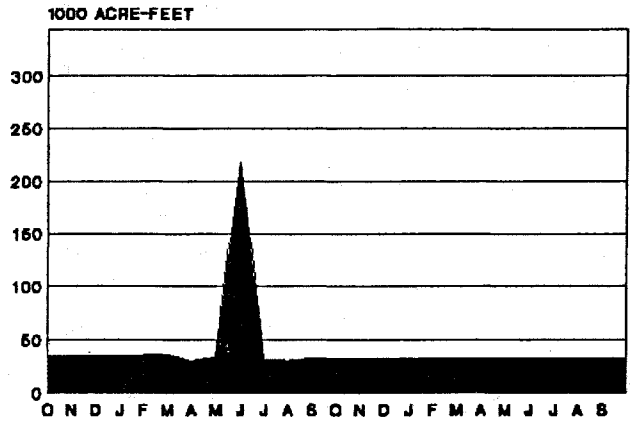
PROJECTED OPERATION 1987
REASONABLE MAXIMUM RELEASES



MOST PROBABLE RELEASES

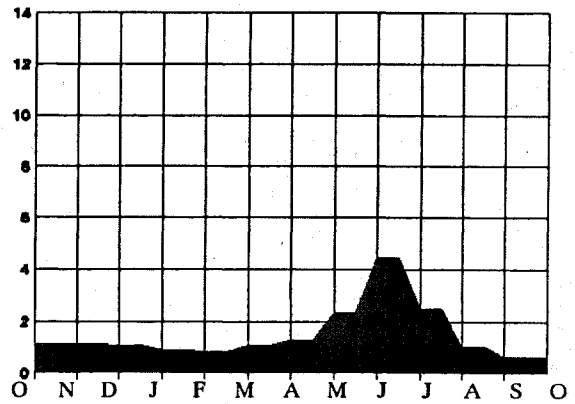


FONTENELLE STORAGE

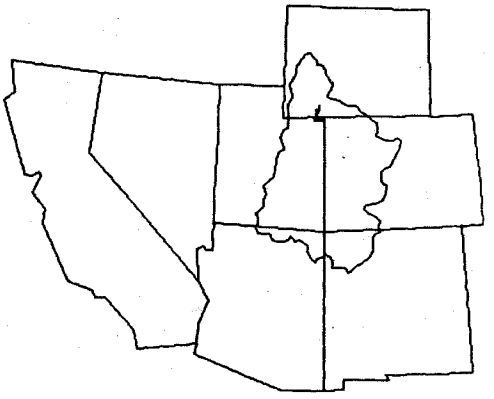


ACTUAL 1986 AND PROJECTED 1987

REASONABLE MINIMUM RELEASES



FLAMING GORGE RESERVOIR (GREEN RIVER)



Water Year 1986

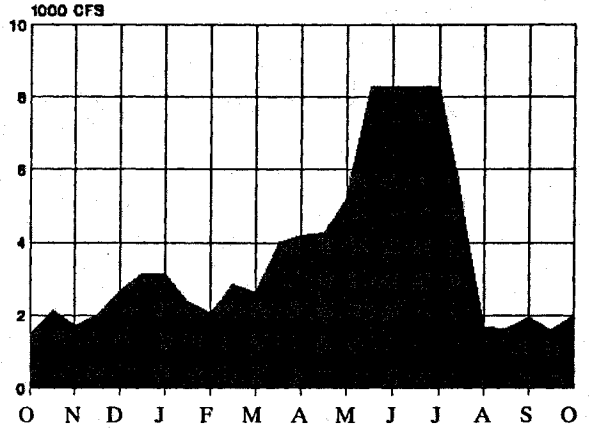
Flaming Gorge Reservoir started water year 1986 at elevation 6,028.6 feet with an active storage of 3,293,000 acre-feet. Releases from Flaming Gorge Dam for water year 1986 were projected to be 1.22 MAF for the most probable operating plan based on the October forecast of an unregulated inflow of 1.65 MAF.

Flaming Gorge Reservoir was gradually drawn down to elevation 6,023.7 feet by January 1, 1986. The forecast of April through July runoff made on January 1, 1986, was 1.56 MAF or 129 percent of average. Powerplant releases for January and February averaged 2,500 cfs. On March 1, 1986, the April through July forecast had increased to 158 percent of average; subsequently, powerplant releases were increased until on March 21, maximum powerplant capacity of 4,200 cfs was reached. Runoff forecasts increased to about 170 percent of average by April 1, 1986. In addition to maximum powerplant releases, the river outlet works were opened to the maximum release of 4,000 cfs on May 10, 1986. These releases were sustained through July 23, 1986, when the river outlet works were closed, and maximum powerplant releases were reduced.

Releases from Flaming Gorge Dam were constrained to a maximum of 2,600 cfs during the months of August and September to provide interim protection to the endangered Colorado Squawfish. This species is currently being studied as part of the Recovery Implementation Program in the Upper Colorado River Basin, and restricted summer flows are thought to enhance the downstream habitat for the fish.

The actual April through July unregulated runoff into Flaming Gorge Reservoir was 2.28 MAF or 188 percent of average. The peak inflow during the runoff was 18,800 cfs on June 9, 1986, and the peak total discharge was 8,280 cfs May through mid-July. The total inflow for water year 1986 was 3.02 MAF or 183 percent of average. Total releases for the water year was 2,592,000 acre-feet of which 584,000 acre-feet bypassed the powerplant. The spillway was not used.

ACTUAL RELEASES WY 1986



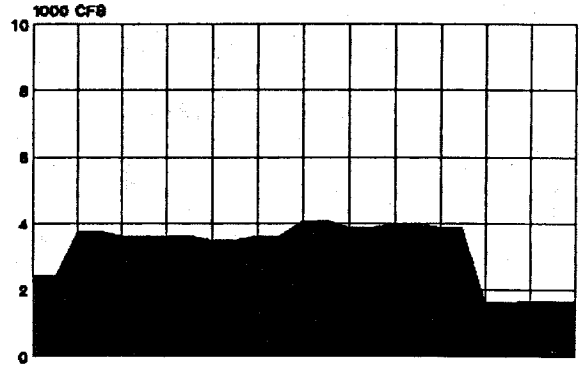
FLAMING GORGE RESERVOIR

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	3,749,000	6,040
Rated Head	1,062,000	5,946
Minimum Power	233,000	5,871
Surface Area, full		42,020 Acres
Reservoir Length, full		91 Miles
Powerplant		
Number of Units		3
Total Capacity		108,000 KW

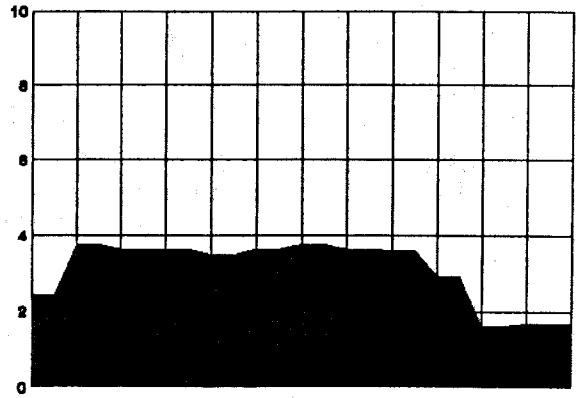
Water Year 1987

It is projected that the water surface at Flaming Gorge will be drawn down to about elevation 6,020 feet before the 1987 spring runoff. This drawdown will facilitate filling Flaming Gorge Reservoir during the 1987 runoff without incurring a high risk of powerplant bypasses. The releases from Flaming Gorge will most probably be maintained near 90 percent of maximum powerplant capacity during most of the water year to accommodate the expected inflow. Under the most probable operation the total water year 1987 releases will be 2.29 MAF with a total unregulated inflow of 2.32 MAF.

PROJECTED OPERATION 1987
REASONABLE MAXIMUM RELEASES



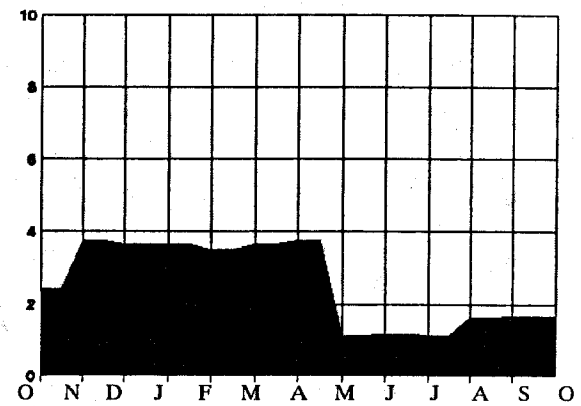
MOST PROBABLE RELEASES



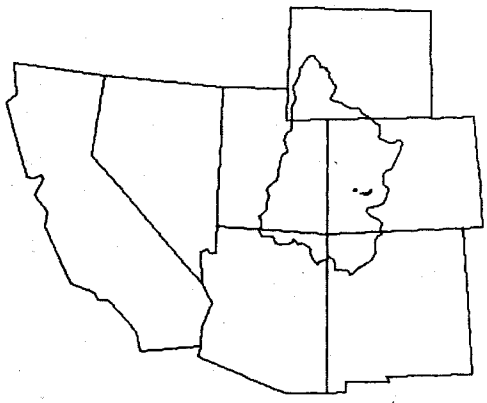
FLAMING GORGE STORAGE

ACTUAL 1986 AND PROJECTED 1987

REASONABLE MINIMUM RELEASES



WAYNE N. ASPINALL UNIT
BLUE MESA, MORROW POINT, AND CRYSTAL RESERVOIRS (GUNNISON RIVER)



Water Year 1986

The Wayne N. Aspinall Unit, is comprised of Blue Mesa, Morrow Point, and Crystal Reservoirs. Blue Mesa provides nearly all of the long term storage and regulation for all three powerplants. Morrow Point provides peaking power, and thus has highly variable releases. The primary function of the Crystal Reservoir is to regulate the variable Morrow Point releases.

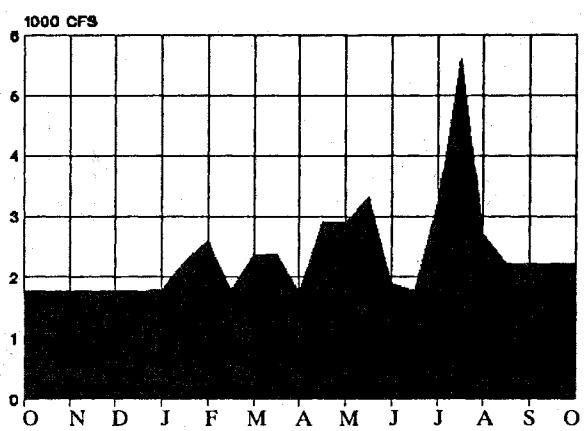
Blue Mesa Reservoir began water year 1986 at elevation 7,508 feet with a storage of 728,000 acre-feet. Releases from Blue Mesa for water year 1986 were projected to be 1,033,000 acre-feet based on the October most probable unregulated inflow of 1,096,000 acre-feet. The reservoir was lowered gradually to elevation 7,488 feet by January 1, 1986. The January 1, 1986, forecast of April through July runoff was 965,000 acre-feet or 126 percent of average. Blue Mesa powerplant releases for January through May averaged about 66 percent of maximum capacity. On June 1, 1986, the forecast had dropped slightly to 124 percent of average, and the elevation of Blue Mesa Reservoir was 7,477 feet. Concern over the forecast, the reservoir elevation, and the runoff through this time period prompted a field inspection of snowcover on the Blue Mesa drainage basin. After an aerial review of snowcover, it was decided to decrease power releases for June in order to fill the reservoir. However, on July 1, 1986, the reservoir had reached elevation 7,516 feet, and the inflow rate was still high; therefore, powerplant releases were increased to about 90 percent of maximum capacity. By July 6, the reservoir had reached elevation 7,518.8 feet with an inflow of 5,350 cfs. With releases from the powerplant at maximum, the river outlet works were opened to 1,100 cfs and increased to their maximum discharge capacity of 2,020 cfs during July 7 through July 16. The river outlet works were finally shut down on July 24.

The actual April through July unregulated runoff into Blue Mesa Reservoir was 1,028,000 acre-feet or 135 percent of average. The total water year 1986 inflow was 1,421,000 acre-feet or 157 percent of average. Releases from Blue Mesa Dam totaled 1,392,000 acre-feet for the water year of which 58,000 acre-feet bypassed the powerplant.

Morrow Point Reservoir operated at or near capacity between elevations 7,150 and 7,161 feet. The April through July side inflow into Morrow Point Reservoir was 70,000 acre-feet which was 119 percent of average. A total of 1,510,000 acre-feet was released during the water year of which 36,000 acre-feet bypassed the powerplant.

Crystal Reservoir also was operated at or near its capacity during water year 1986. The April through July side inflow to Crystal was 105,000 acre-feet which was 119 percent of average. A total of 1,667,000 acre-feet was released during the water year of which 387,000 acre-feet bypassed the powerplant. During water year 1986 the maximum combined release was 5,700 cfs on July 10, 1986.

ACTUAL CRYSTAL RELEASES WY 1986



BLUE MESA RESERVOIR

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	829,523	7,519
Rated Head	249,395	7,438
Minimum Power	81,070	7,393
Surface Area, full		9,180 Acres
Reservoir Length, full		24 Miles

Powerplants (Blue Mesa, Morrow Point, & Crystal)

Number of Units	5
Total Capacity	208,000 KW

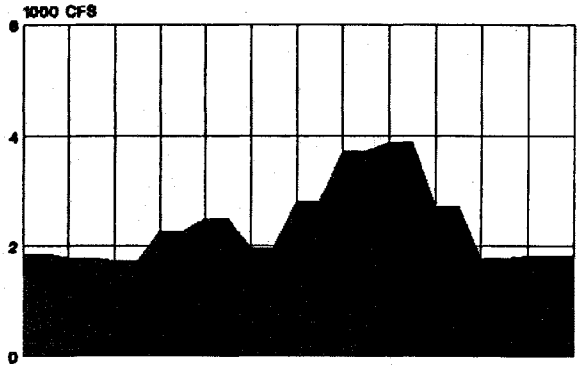
Water Year 1987

Blue Mesa powerplant will be operated to minimize powerplant bypasses at Crystal Dam. Assuming near average inflow during water year 1987, a low elevation of 7,448 feet is expected by the end of March, with a maximum elevation of 7,519 feet in July.

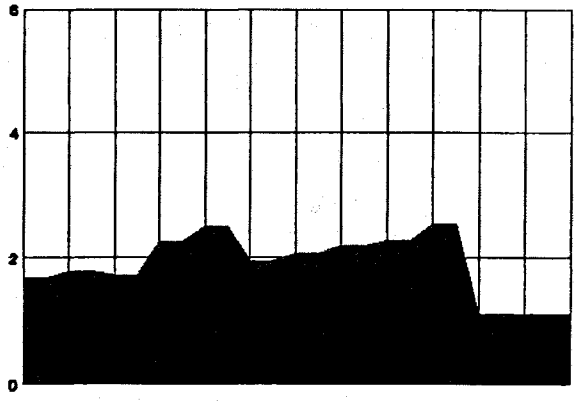
Morrow Point Reservoir will fluctuate up to its release capacity during the coming year. Crystal Reservoir will operate at full capacity to regulate the releases from Morrow Point and to meet downstream requirements for fish habitat and diversions through the Gunnison Tunnel.

With reasonable maximum inflows, releases from Crystal Dam will be at least 4,000 cfs and possibly higher. Assuming near average inflow conditions, releases from Crystal Reservoir will be at maximum powerplant capacity of 1,700 cfs in addition to scheduled bypasses of up to 1,000 cfs. Under reasonable minimum inflow conditions, releases will range from 1,000 cfs to 1,700 cfs.

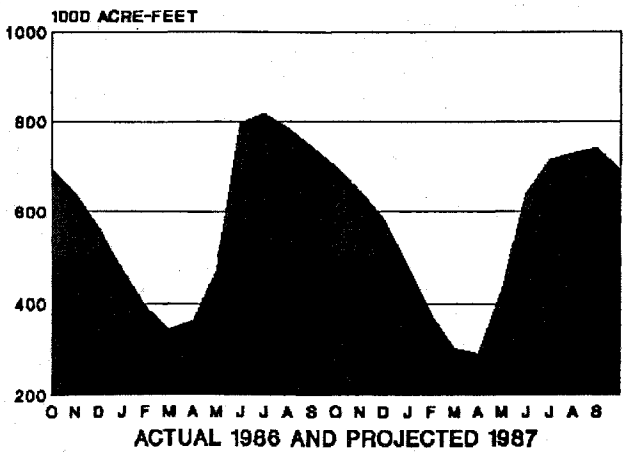
PROJECTED OPERATION 1987
REASONABLE MAXIMUM CRYSTAL RELEASES



MOST PROBABLE RELEASES

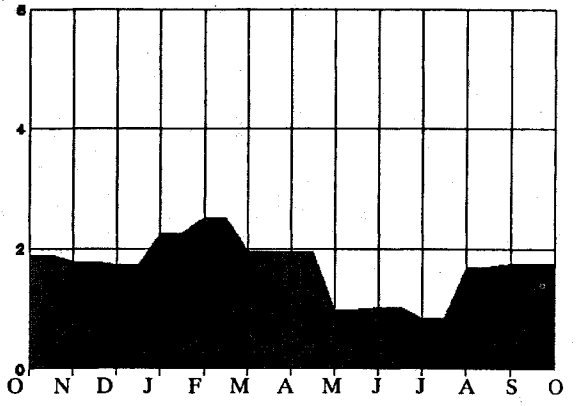


BLUE MESA STORAGE

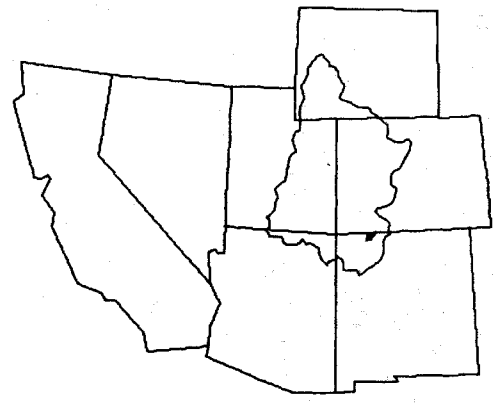


ACTUAL 1986 AND PROJECTED 1987

REASONABLE MINIMUM RELEASES



NAVAJO RESERVOIR
(SAN JUAN RIVER)



Water Year 1986

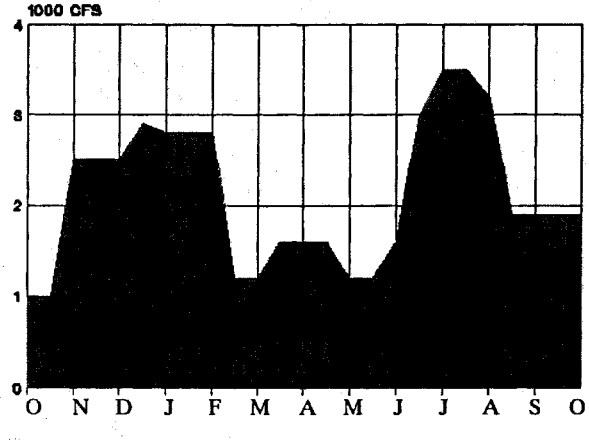
The elevation of Navajo Reservoir at the beginning of water year 1986 was 6,078 feet with 1,586,000 acre-feet of active storage. It was planned that Navajo Reservoir would fill to near its maximum elevation of 6,085 feet with an average 1986 runoff. It was also planned to avoid the use of the spillway since spills cause high levels of nitrification in the San Juan River, detrimental to the blue ribbon quality trout population.

The April through July runoff forecast made in January 1986 was 950,000 acre-feet, which was 150 percent of average. Releases of up to 2,750 cfs were maintained during January through February 8 to contain this projected volume of runoff. Navajo Reservoir was drawn down to elevation 6,050 feet at this time. However, the February forecast of April through July runoff declined to 800,000 acre-feet or 126 percent of average which dictated that releases be dropped to 1,200 cfs.

The March and April forecasts increased to 134 percent of average forcing Navajo Dam releases up to 1,700 cfs during these months. The May and June forecast was 157 percent of average. Flows were increased to a maximum of 3,500 cfs in June, and Navajo Reservoir reached a peak elevation of 6,084.0 on June 30, 1986.

The actual April through July 1986 runoff volume into Navajo Reservoir was 1,035,000 acre-feet, 163 percent of average. The total water year 1986 inflow was 1,614,000 acre-feet, which was 169 percent of average. The minimum sustained release level from Navajo Dam was 1,000 cfs while the maximum release was 3,500 cfs. The peak inflow to Navajo Reservoir during the 1986 runoff was 9,000 cfs on April 2, 1986. The spillway at Navajo Dam was not used.

ACTUAL RELEASES WY 1986



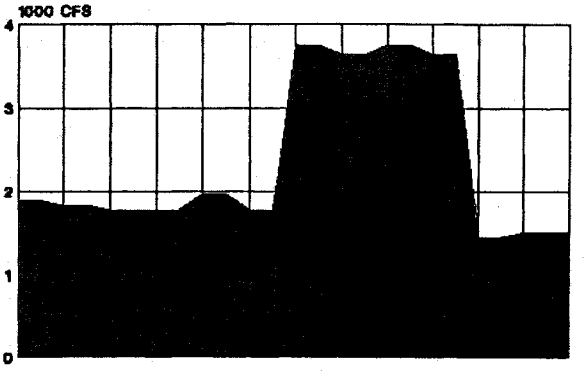
NAVAJO RESERVOIR

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	1,696,400	6,085
Inactive Storage	660,500	5,990
Surface Area, full		15,610 Acres
Reservoir Length, full		33 Miles

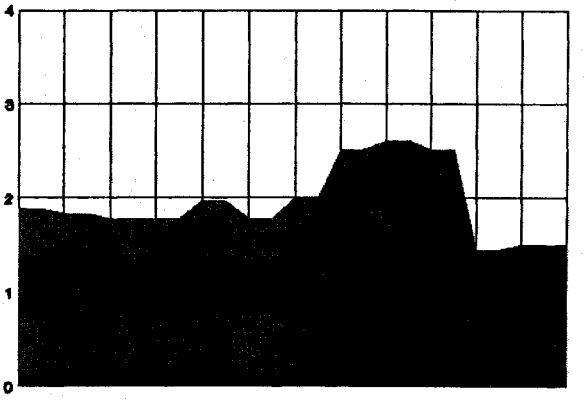
Water Year 1987

It is projected that Navajo Reservoir will be drawn down to near elevation 6,042 feet by April 1987 in preparation for dam safety modification work. A hydrofraise concrete cutoff wall is scheduled to be constructed to reduce the amount of seepage through the embankment dam. Releases are expected to be held near 2,000 cfs throughout most of the 1987 winter months to accomplish this level of drawdown. An above average runoff during water year 1987 is expected to fill Navajo Reservoir and a reasonable minimum level of inflow would cause the minimum releases to be near the 800 cfs level for irrigation, consumptive use, and maintenance of fish and wildlife. A reasonable maximum inflow would force releases to about 3,800 cfs.

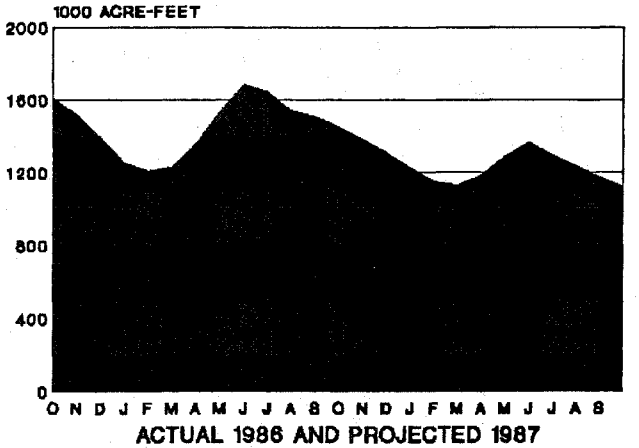
PROJECTED OPERATION 1987
REASONABLE MAXIMUM RELEASES



MOST PROBABLE RELEASES

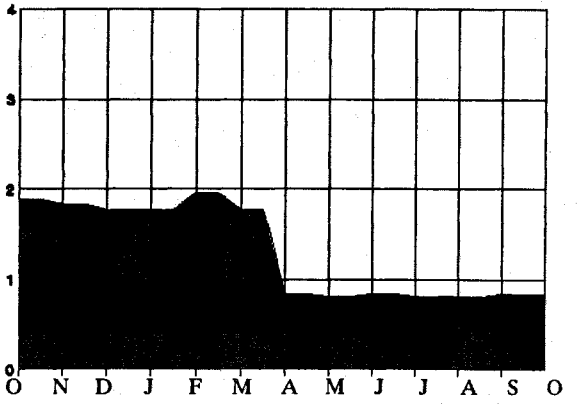


NAVAJO STORAGE

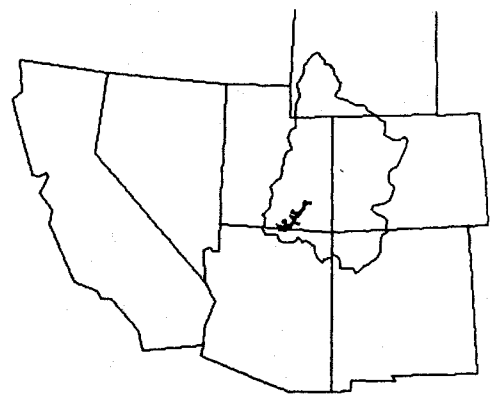


ACTUAL 1986 AND PROJECTED 1987

REASONABLE MINIMUM RELEASES



LAKE POWELL
(COLORADO RIVER)



Water Year 1986

Lake Powell, which is impounded by Glen Canyon Dam, was operated as part of the Colorado River Storage Project (CRSP) in accordance with governing contracts and laws to provide conservation storage, river regulation, power generation, recreation, and fish and wildlife enhancement during water year 1986.

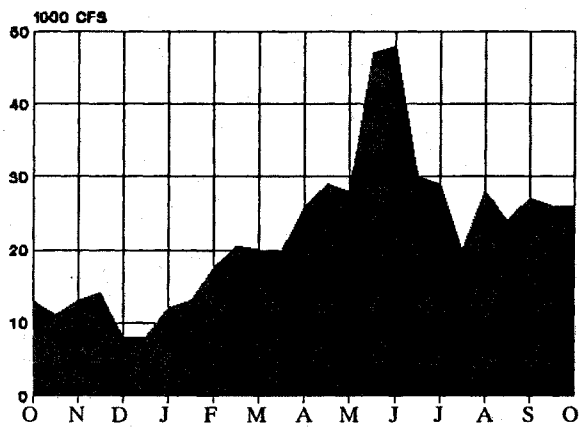
At the start of water year 1986, Lake Powell had an active content of 22.8 MAF at elevation 3,685.6 feet (91 percent full). The most probable operating plan based on the October forecast called for total water year releases of 12.2 MAF based on an unregulated inflow of 13.5 MAF.

On January 1, 1986, Lake Powell was at elevation 3,687 with an active content of 23.0 MAF. The January 1, 1986, forecast of April through July runoff for Lake Powell was 10.6 MAF, or 130 percent of average. Discharges from Glen Canyon powerplant averaged 20,000 cfs for January and February. In March the forecast increased to 135 percent and was 132 percent of average on April 1. To reduce the risk of bypassing the powerplant, releases were increased to 90 percent of capacity during March and 100 percent of capacity during April.

The April through July runoff forecast made on May 1, 1986, had increased to 12.6 MAF or 154 percent of average. To contain this volume of runoff the river outlet works at Glen Canyon were opened on May 8, 1986, to bypass a discharge of 17,000 cfs. This bypass release was maintained together with maximum powerplant releases of 31,500 cfs for the remainder of the month of May. The June 1, 1986, runoff forecast increased to 13.0 MAF or 159 percent of average, and the river outlet works remained open at 8,000 cfs for the first week of June. On June 10, 1986, Lake Powell recorded its peak regulated inflow of 79,000 cfs. At this time the river outlet works were shut off and maximum powerplant releases were sustained for the rest of June. Powerplant releases were reduced during the month of July to allow Lake Powell to gradually fill. The maximum lake elevation of 3,700.02 feet was reached on July 27-28, 1986.

The total 1986 water year unregulated inflow to Lake Powell was 18.2 MAF which is equivalent to a reasonable maximum (upper decile) water supply. Total water year releases below Glen Canyon were 16.6 MAF of which 1.02 MAF bypassed the powerplant. The spillways at Glen Canyon were not used.

ACTUAL RELEASES WY 1986



LAKE POWELL

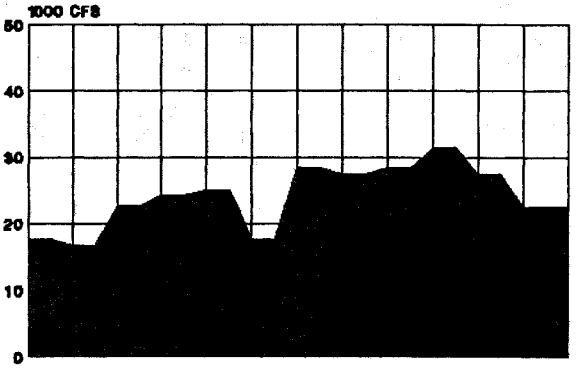
Reservoir	Acre-feet	Elevation, feet
Maximum Storage	25,002,000	3,700
Rated Head	9,428,000	3,570
Minimum Power	4,126,000	3,490
Surface Area, full		161,390 Acres
Reservoir Length, full		186 Miles
Powerplant		
Number of Units		8
Total Capacity		1,247,000 KW

Water Year 1987

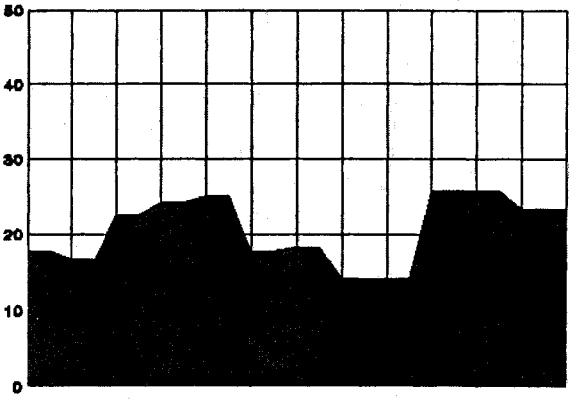
Lake Powell begins the water year at elevation 3,689.6 feet with an active content of 23.4 MAF (93.4 percent full). The plan of operation through December is to maintain releases at about 65 percent powerplant capacity, and then to increase releases during the January through March period to about 74 percent of powerplant capacity to reduce the risk of spilling during the 1987 runoff season. This will develop sufficient vacant reservoir space, and also maximize power output during the winter months.

Assuming average runoff conditions, releases from Lake Powell for water year 1987 will be 14.7 MAF. A reasonable minimum level of inflow would produce an annual release of 11.7 MAF, and a reasonable maximum level of inflow would require that 17.2 MAF be released during the water year. Releases from Lake Powell after January 1, 1987, will be reevaluated based upon runoff forecasts reflecting current hydrologic conditions. It is expected that powerplant bypasses will be avoided in all three operating plans.

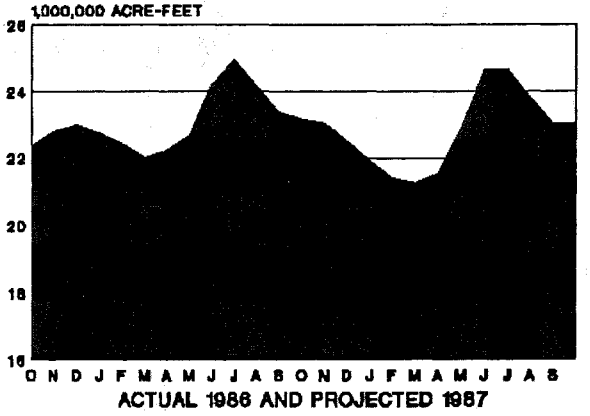
PROJECTED OPERATION 1987
REASONABLE MAXIMUM RELEASES



MOST PROBABLE RELEASES

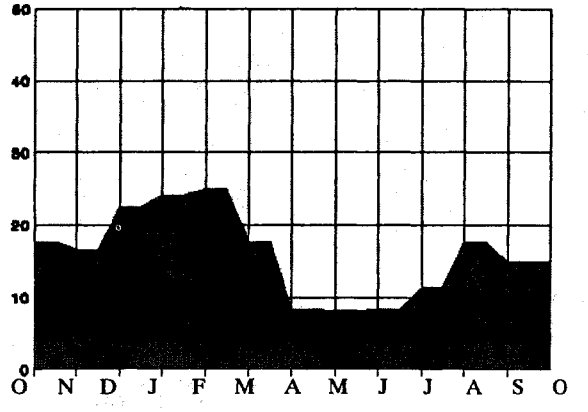


LAKE POWELL STORAGE

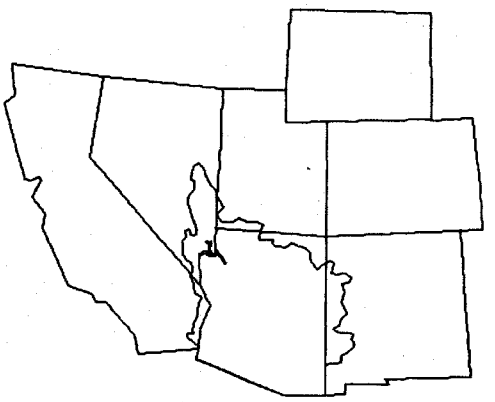


ACTUAL 1986 AND PROJECTED 1987

REASONABLE MINIMUM RELEASES



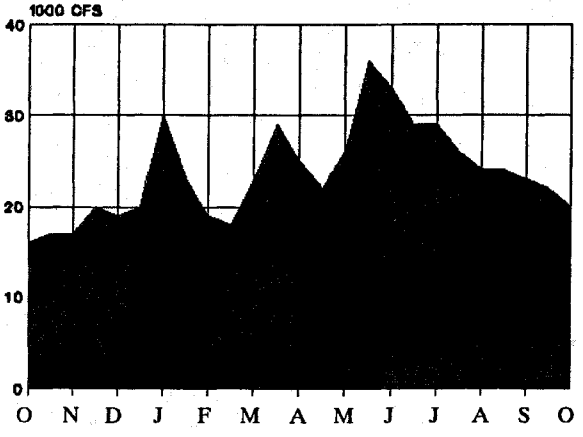
LOWER BASIN RESERVOIRS
LAKE MEAD
(COLORADO RIVER)



Water Year 1986

At the beginning of water year 1986, Lake Mead, impounded by Hoover Dam, had a water surface elevation of 1,213 feet and an active storage of 24,875,000 acre-feet. During the winter months, the water level gradually declined to 1,201 feet near the end of January 1986. During the high inflow conditions of June and July, Lake Mead reached a high elevation of 1,210.2 feet in the last week of June, with a peak active storage of 24,421,000 acre-feet. During the water year, releases were made to meet downstream water use requirements in the United States and Mexico, flood control requirements, programmed levels of Lakes Mohave and Havasu, transit losses which include river and reservoir evaporation, uses by phreatophytes, changes in bank storage, unmeasured inflows, and diversions. The total release from Lake Mead through Hoover Dam during water year 1986 was approximately 17,213,000 acre-feet. All of that amount passed through the turbines for power production. At the end of the water year, Lake Mead had a water surface elevation of 1,209 feet and an active storage of 24,220,000 acre-feet which reflects a decrease in storage during the water year of 655,000 acre-feet. On September 30, 1986, the active storage of Lake Mead was 855,000 acre-feet greater than the active storage in Lake Powell.

ACTUAL RELEASES WY 1986



LAKE MEAD

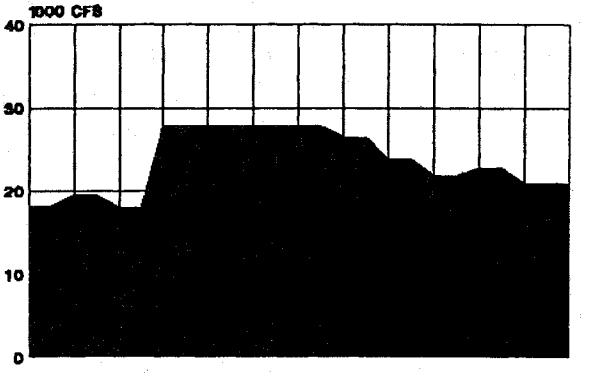
Reservoir	Acre-feet	Elevation, feet
Maximum Storage	27,377,000	1,229
Rated Head	13,653,000	1,123
Minimum Power	10,024,000	1,083
Surface Area, full		162,700 Acres
Reservoir Length, full		18 Miles

Powerplant	
Number of Units	17
Total Capacity	1,429,000 KW

Water Year 1987

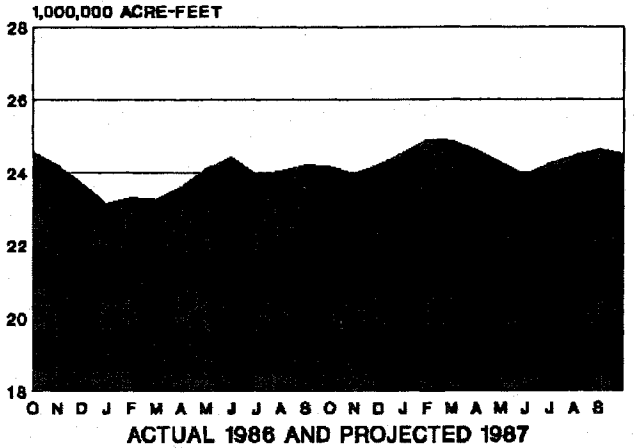
Under most probable inflow conditions during the 1987 water year, the Lake Mead water level is scheduled to be drawn down to elevation 1,207 feet at the end of June 1987. At that level, the lake will have in active storage of approximately 23.9 MAF. During water year 1987, a total of about 14.0 MAF is scheduled to be released from Lake Mead under most probable conditions, all passing through the powerplant.

PROJECTED OPERATION 1987
REASONABLE MAXIMUM RELEASES



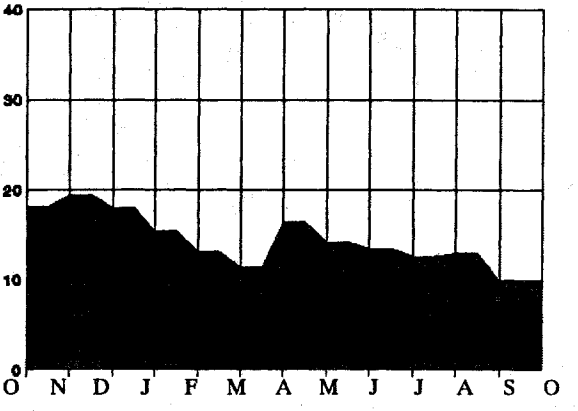
MOST PROBABLE RELEASES

LAKE MEAD STORAGE

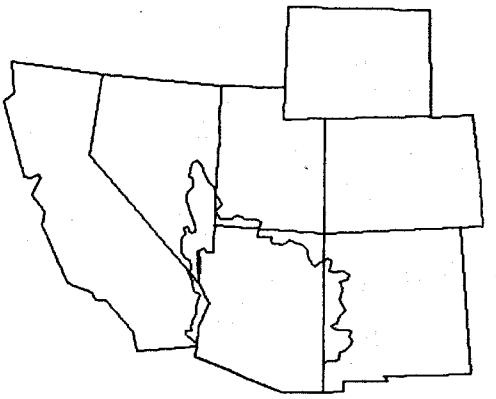


ACTUAL 1986 AND PROJECTED 1987

REASONABLE MINIMUM RELEASES



LAKE MOHAVE
(COLORADO RIVER)



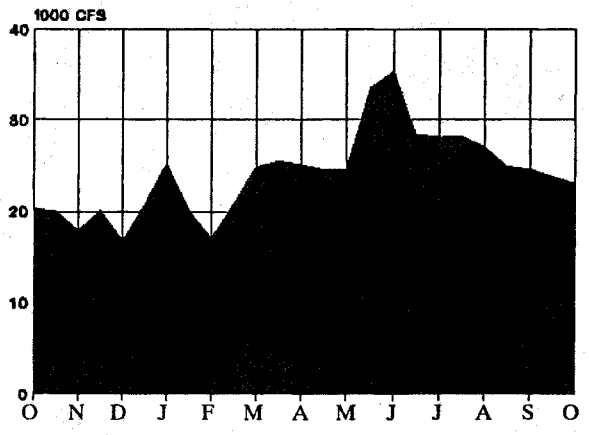
Water Year 1986

At the beginning of water year 1986, the water surface elevation of Lake Mohave, which is impounded by Davis Dam, was 637.7 feet, with an active storage of approximately 1,555,000 acre-feet.

During the winter months, the water level was gradually lowered to approximately 631 feet, with an active storage of about 1,395,000 acre-feet by the latter part of December 1985. The water level was then gradually raised during the remaining winter months. The reservoir reached elevation 642 feet during the first part of February 1986. During March, Lake Mohave dropped to an elevation of about 638 feet, with an active storage of approximately 1,557,000 acre-feet. Lake Mohave was at an elevation of about 643 acre-feet during the first part of June. The reservoir ended the water year at an elevation of 631.4 feet with 1,395,000 acre-feet in active storage.

Lake Mohave releases were made to satisfy flood control requirements and downstream water use requirements, including diversions by The Metropolitan Water District of Southern California (MWD). A small amount of regulation occurred at Lake Havasu. During the water year, approximately 17,393,000 acre-feet were released at Davis Dam. Of that amount, approximately 16,468,000 acre-feet passed through the turbines for power production.

ACTUAL RELEASES WY 1986



LAKE MOHAVE

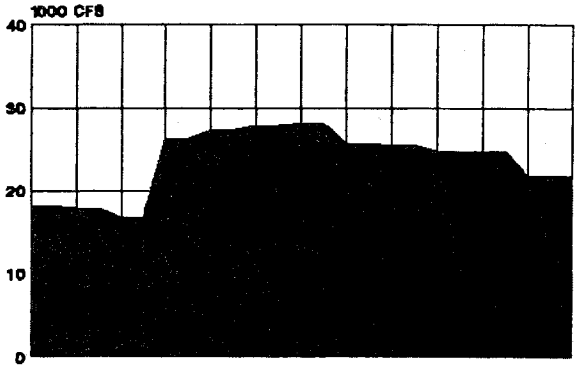
Reservoir	Acre-feet	Elevation, feet
Maximum Storage	1,810,000	647
Rated Head	1,188,000	623
Minimum Power	217,500	570
Surface Area, full		28,200 Acres
Reservoir Length, full		67 Miles

Powerplant	
Number of Units	5
Total Capacity	240,000 KW

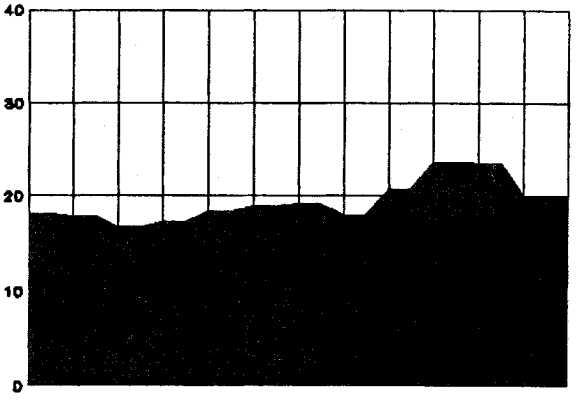
Water Year 1987

Under most probable inflow conditions the water level of Lake Mohave is scheduled to reach an elevation of 643 feet by the end of February 1987 and then rise to elevation 645 feet by the end of May. The reservoir will gradually drop to an elevation of 631 feet by the end of the water year. During the water year a total of 14.2 MAF is scheduled to be released from Lake Mohave to meet all downstream and flood control requirements. All of that total is scheduled to pass through the powerplant.

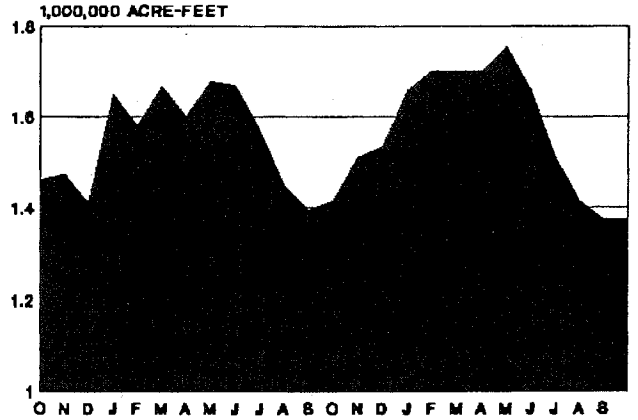
PROJECTED OPERATION 1987
REASONABLE MAXIMUM RELEASES



MOST PROBABLE RELEASES

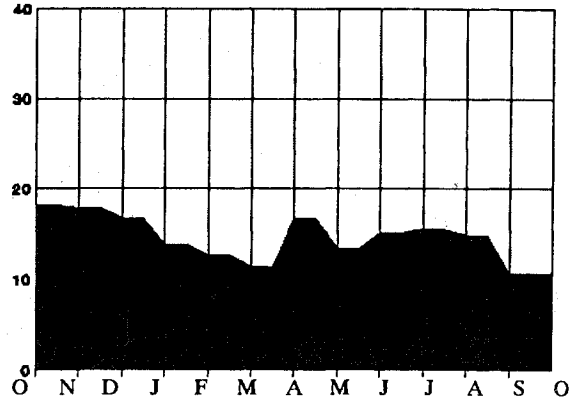


LAKE MOHAVE STORAGE

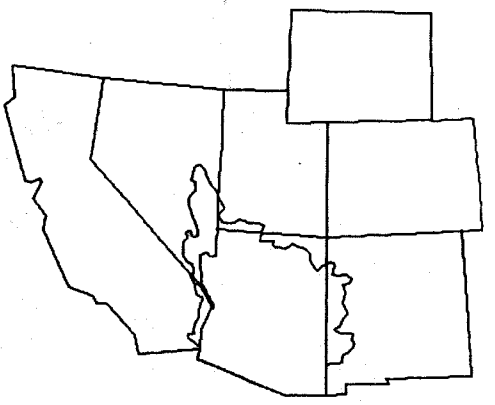


ACTUAL 1986 AND PROJECTED 1987

REASONABLE MINIMUM RELEASES



LAKE HAVASU
(COLORADO RIVER)



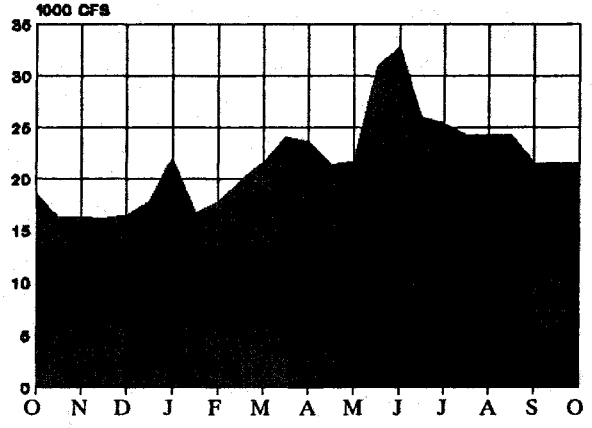
Water Year 1986

At the beginning of water year 1986, the water level of Lake Havasu, impounded by Parker Dam, was at elevation 446 feet with an active storage of approximately 540,000 acre-feet. During October, November, and December 1985, the reservoir fluctuated between elevation 446 feet and 448 feet. In early April 1986, the reservoir was at elevation 446 feet to provide vacant space for runoff from the drainage area between Davis and Parker Dams. The water level was then raised to an approximate elevation of 449 feet near the first part of May, with an active storage of about 602,000 acre-feet. At the end of the water year, Lake Havasu was at an elevation of about 448 feet with an active storage of 577,000 acre-feet.

During the water year, approximately 16,015,000 acre-feet were released at Parker Dam, of which approximately 14,703,000 acre-feet passed through the turbines for power production. The total release amount included releases from Alamo Dam on the Bill Williams River. In addition to the releases from Parker Dam, approximately 1,294,000 acre-feet were diverted from Lake Havasu by MWD. Diversions from Lake Havasu for the Central Arizona Project (CAP) were 109,000 acre-feet during the water year.

Space in the top 10 feet of Lake Havasu (about 180,000 acre-feet) is reserved by the United States for control of floods and other uses, including river regulation. Normally, only about the top 4 feet, or 77,000 acre-feet of space, have been used for this purpose since the Alamo Reservoir on the Bill Williams River has been in operation.

ACTUAL RELEASES **WY 1986**



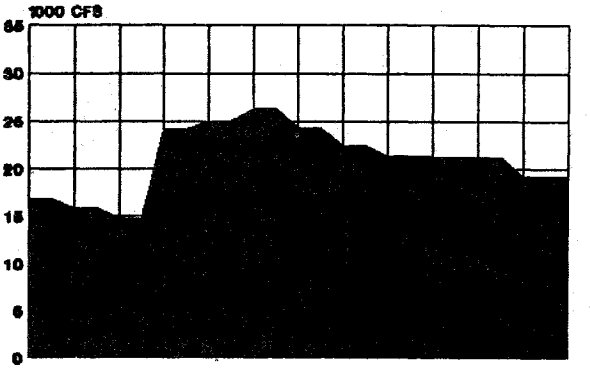
LAKE HAVASU

Reservoir	Acre-feet	Elevation, feet
Maximum Storage	619,400	450
Rated Head	619,400	450
Minimum Power	439,400	440
Surface Area, full		20,400 Acres
Reservoir Length, full		35 Miles
Powerplant		
Number of Units		4
Total Capacity		120,000 KW

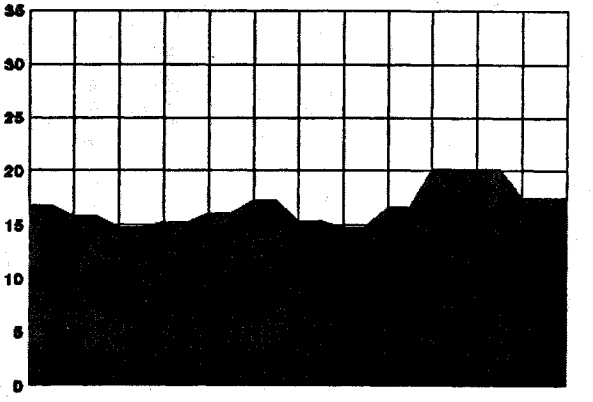
Water Year 1987

Lake Havasu is scheduled at the highest levels consistent with the requirements for maintaining reservoir regulation space. The yearly low elevation of approximately 446 feet is scheduled for the October through February high flood hazard period. The yearly high of about 450 feet is scheduled for the low flood hazard months of May and June. During water year 1987, a total of approximately 12.2 MAF is scheduled to be released from Lake Havasu to meet all downstream and flood control requirements. All of that amount except 26,000 acre-feet is scheduled to pass through the Parker Powerplant.

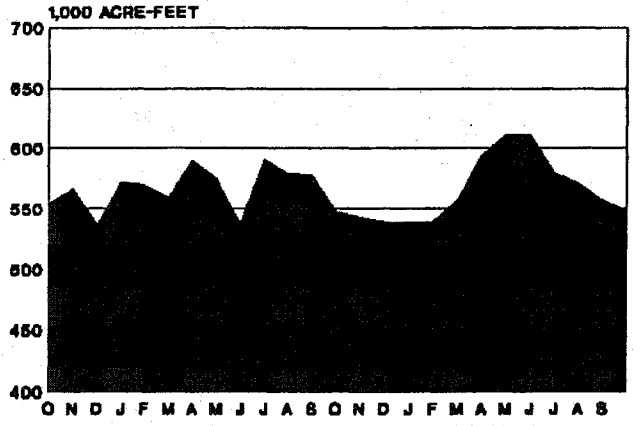
PROJECTED OPERATION 1987
REASONABLE MAXIMUM RELEASES



MOST PROBABLE RELEASES

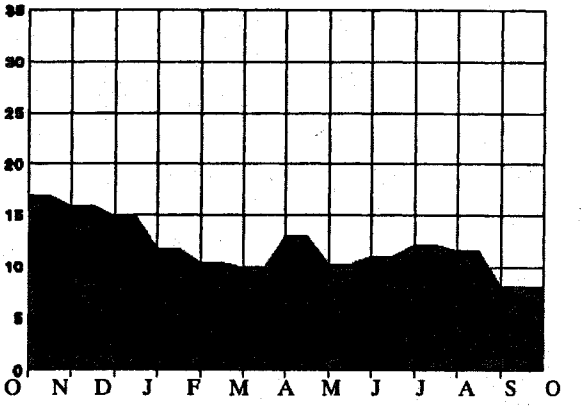


LAKE HAVASU STORAGE



ACTUAL 1986 AND PROJECTED 1987

REASONABLE MINIMUM RELEASES



River Regulation

Daily releases are made from the storage reservoirs in the Lower Basin to meet the incoming orders of the water user agencies or for the regulation of higher flood control and releases of excess water. When possible, all water passes through the powerplant units. The daily releases are regulated on an hourly basis to meet as nearly as possible the peaking power needs of the hydroelectric power customers. Minimum daily flow objectives are provided in the river to maintain fishery habitat. The combination of high runoff conditions and river regulation below Hoover Dam resulted in a total water year 1986 delivery to Mexico of approximately 9.3 MAF in excess of the scheduled treaty quantity (1,700,000 acre-feet per calendar year). Of that amount, 105,500 acre-feet of drainage waters were bypassed to the Gulf of California via the Bypass Drain during water year 1986. This bypass channel was constructed pursuant to provisions of Minute No. 242 of the International Boundary and Water Commission.

Flood Control

Lake Mead is operated in accordance with updated flood control regulations which are specified in the Field Working Agreement between Reclamation and the Corps of Engineers, signed in 1982. The regulations stipulate minimum release levels from Lake Mead to route the reasonable maximum inflow. The reasonable maximum inflow is the estimated inflow volume that, on the average, will not be exceeded 19 out of 20 times. This volume is derived by adding an "uncertainty" term to the most probable runoff forecast. In 1983, unusual hydrometeorological events resulted in unprecedented large forecasting errors. Subsequent reassessment of the estimate of the "uncertainty" term led to adoption of larger values for use in determining the probable maximum inflow in 1984 and thereafter.

There were no significant damages along the river in the Lower Basin during water year 1986. There was, however, some minor bank erosion in the Lower Basin below Yuma on the Quechan Indian Reservation, and a contractor was hired to riprap at that location. In the North Gila area near the confluence of the Gila River and the Colorado River, some bank erosion also was experienced. This was repaired by government forces.

Scour in some reaches of river channel has continued to occur, and therefore river levels have been lower in some areas than they were with the same release levels during the last 3 years. In a few areas, however, reaches have refilled due to heavy sediment loads. One example is the reach below Cibola Valley in the Lower Basin.

Total Colorado River reservoir system storage at the start of water year 1986 was approximately 55,514,000 acre-feet and about 55,611,000 acre-feet at the end of the water year, representing a 97,000 acre-foot decrease in total remaining available reservoir space.

In addition to the mainstem structures, Alamo Dam on the Bill Williams River and Painted Rock Dam on the Gila River (both in the Lower Basin) received flood inflow during water year 1986. During water year 1987, Painted Rock and Alamo Reservoirs are scheduled to be operated in accordance with established flood control criteria to maximize the available flood control space remaining in their respective reservoirs.

Water Quality Operations

In recognizing the need to manage the water quality of the Colorado River, it was recommended that long-term salinity increases in the river be controlled through a water quality improvement program as described in the report "Colorado River Water Quality Improvement Program" dated February 1972.

The program called for a basin-wide approach to salinity control while the Upper Basin continues to develop its compact-apportioned waters. The initial step toward improvement of the future water quality in the basin was the passage by Congress of the Colorado River Basin Salinity Control Act of 1974 (Act) (Public Law 93-320) on June 24, 1974, authorizing the construction of various features for the enhancement and protection of the quality of water available in the Colorado River for use in the United States and the Republic of Mexico.

Title I of the Act enables the United States to comply with its obligation under the agreement with Mexico of August 30, 1973 (Minute 242 of the International Boundary and Water Commission, United States and Mexico), which was concluded pursuant to the Treaty of February 3, 1944 (TS994). Title I authorized the construction of the Yuma Desalting Plant and a bypass drain to ultimately discharge the plant's brine. These facilities, and others, will enable the delivery of water at Morelos Dam, for subsequent use in Mexico, having an average salinity no greater than 115 parts per million (ppm) plus or minus 30 ppm (United States count) higher than the annual average salinity of the Colorado River water at Imperial Dam.

Title II of the Act authorized the Secretary to construct a number of units in the basin above Imperial Dam, as well as the investigation of several other potential salinity control units. The Act, and its amendment by Public Law 98-569 of October 30, 1985, directs the Secretary to submit a biennial report to the President, the Congress, and the Colorado River Basin Salinity Control Advisory Council. Since the water quality aspects of Colorado River operations are extensively described in that biennial series, the latest of which is Report No. 12 entitled, "Quality of Water, Colorado River Basin," dated January 1985, only minimal discussion of this aspect of the water quality below Imperial Dam is presented in this report.

During water year 1986, the United States bypassed a total of 105,500 acre-feet through the Bypass Drain. As the river was in an excess flow condition during 1986 due to the high runoff in the basin, no specific releases from the upstream reservoirs were necessary to replace this water to meet the quantity requirements of the Mexican Treaty of 1944.

During water year 1986, the average annual salinity of the Colorado River water arriving at Imperial Dam was 584 ppm. During this same period, the salinity of the waters arriving at Morelos Dam was 605 ppm, resulting in an annual average salinity differential of only 21 ppm, well within the requirement of Minute 242 of the International Boundary and Water Commission.

The total flows in the bypass drain during water year 1987 are projected to be 105,000 acre-feet. A minor amount of drainage water could be returned to the Colorado River below Morelos Dam during 1987. Due to the excess flow conditions that are expected, it will not be necessary to provide replacement water to Mexico for the bypassed flows.

Beneficial Consumptive Uses

An extensive discussion of consumptive uses is not attempted in this report as that subject has been treated in detail in Reclamation's "Colorado River System Consumptive Uses and Losses Report, 1981-1985." This report has been prepared jointly by the Upper and Lower Colorado Regional Offices and is due to be released in 1988. It presents estimates of the consumptive uses and losses from the Colorado River System for each year from 1981 through 1985. The following table summarizes annual water use from the system by States, including water use supplied by ground-water overdraft.

Upper Basin Uses and Losses

The three largest categories of consumptive use in the Upper Colorado River Basin are agricultural uses within the basin, transbasin diversions to adjacent drainages, and evaporation losses from the major reservoirs of the Colorado River System. During water year 1986, the estimated use for municipal and industrial supply and for agriculture in the Upper Basin was 2,800,000 acre-feet. Estimated evaporation losses were 610,000 acre-feet from mainstem reservoirs. About 670,000 acre-feet was diverted for use in adjacent drainages. Total estimated consumptive use amounted to 3,700,000 acre-feet. Storage in the Upper Basin mainstem reservoirs increased by approximately 888,000 acre-feet during water year 1986.

Lower Basin Uses and Losses

During water year 1986, an estimated 5.3 MAF of water were released from Lake Havasu to meet the requirements for water deliveries at Imperial Dam, as well as those of the Colorado River Indian Reservation near Parker, Arizona, the Palo Verde Irrigation District near Blythe, California, other miscellaneous users along the river, and transit losses between Parker Dam and Imperial Dam.

The major water diversion above Parker Dam was by MWD. MWD pumped approximately 1,294,000 acre-feet from Lake Havasu during water year 1986.

Releases of approximately 6.6 MAF were made from Lake Mohave during water year 1986 to meet minimum downstream needs in the United States at Parker Dam; to supply diversion requirements of MWD, miscellaneous contractors, and other users; to offset evaporation and other transit losses between Davis and Parker Dams; and to maintain the scheduled levels of Lake Havasu.

During water year 1986, releases of approximately 6.6 MAF were made from Lake Mead at Hoover Dam to regulate the levels of Lake Mohave, to provide for the small users from that reservoir, and to provide for releases at Davis Dam. In addition, 175,000 acre-feet were diverted from Lake Mead for use by the Lake Mead National Recreation Area, Boulder City; Basic Management, Inc.; and contractors of the Colorado River Commission of Nevada. Total releases and diversions from Lake Mead during water year 1986 were an estimated 17,388,000 acre-feet.

For water year 1987, a total release of 12.2 MAF from Lake Havasu has been projected, including consumptive use requirements in the United States below Parker Dam, transit losses and regulation in the river between Parker Dam and the Mexican Border, flood control requirements, and treaty deliveries to Mexico.

During water year 1987, MWD is expected to divert 1,269,000 acre-feet by pumping from Lake Havasu. Consumptive uses by small users, river losses or gains, and reservoir losses between Davis Dam and Parker Dam are projected to be a net loss of 120,000 acre-feet.

There are no major users between Hoover Dam and Davis Dam. During water year 1987 the net diversions from Lake Mead are projected at 141,000 acre-feet. Evaporation from Lake Mead is projected to be about 980,000 acre-feet and net gain between Glen Canyon Dam and Lake Mead is expected to be about 886,000 acre-feet.

Water Use by States

1981-1985

(1,000 acre-feet)

	1981	1982	1983	1984	1985	Average 1981-1985
Arizona	6,896	5,609	4,533	5,508	5,398	5,589
Californa	4,836	4,346	3,950	4,676	4,707	4,503
Colorado	2,235	2,227	2,043	1,973	2,113	2,118
Nevada	212	212	195	206	209	207
New Mexico	345	477	477	444	440	437
Utah	836	795	762	810	933	827
Wyoming	327	316	331	289	320	317
Other	1,548	1,483	1,716	1,657	1,713	1,623
Sub-total Colorado River Basin	17,235	15,465	14,007	15,563	15,833	15,621
Water Passing to Mexico						
Treaty	1,751	1,495	1,646	1,694	1,671	1,651
Minute 242	131	146	166	138	131	142
Excess Releases	2,115	176	7,970	15,160	11,594	7,403
Sub-total Water Passing to Mexico	3,997	1,817	9,782	16,992	13,396	9,196
Total - Colorado River System and Water Passing to Mexico	21,232	17,282	23,789	32,555	29,229	24,817

NOTE:

Onsite consumptive uses and losses; includes water uses satisfied by groundwater overdrafts. Other water uses represents mainstem reservoir evaporation in the Upper Basin and mainstem reservoir evaporation below Lee Ferry in the Lower Basin.

Power Operations and Major Maintenance Activities

Upper Basin - Colorado River Storage Project

Westinghouse Electric Corporation continued contract work to uprate the generators at Glen Canyon Powerplant. During 1986, work was completed on units 8 and 7; later in the year, work was started on unit 4. Uprating is scheduled for completion by early April 1987.

The following table summarizes CRSP generation, purchases, disposition, and revenues from power operations for fiscal year 1986, and present projections for fiscal year 1987. The total revenue from power operations in fiscal year 1986 was $122,479,340.

CRSP Power Generation

Water Year 1986

Sources of Energy	Kilowatt-hours
Net Generation	
Blue Mesa	396,710,738
Crystal	242,561,594
Flaming Gorge	720,356,000
Fontenelle	407,600
Glen Canyon	7,676,995,276
Morrow Point	508,014,051
Sub-total- Net Generation	9,544,230,059
Purchases	443,208,000
Miscellaneous	**Kilowatt-hours**
Interchange Receipts	1,268,219,125
Energy Charges to Transmission Service Customers	277,466,000
Sub-total-Miscellaneous	1,545,685,125
Total Energy From All Sources	11,533,123,184
Disposition of Energy	**Kilowatt-hours**
Firm Energy Sales	6,977,901,000
Nonfirm Energy Sales	3,123,996,000
Emergency Fuel Replacement (Oil Conservation)	-0-
Interchange Deliveries	385,000,000
System Losses	1,046,226,184
Total Energy Distributed	11,533,123,184

Revenue	Dollars
Firm Power Sales	$ 69,140,377
Non Firm Power Sales	41,188,361
Emergency Fuel Replacement (Oil Conservation)	-0-
Reserve Capacity	-0-
Parker-Davis Project Firming	-0-
Transmission Service	2,032,588
Rental of Substation Facilities	278,381
Miscellaneous Revenue	9,839,633
Total Gross Revenue	$122,479,340

Water Year 1987

(Projected)	Kilowatt-hours
Estimated Energy Sales	6,120,000,000
Estimated Purchases	890,000,000
Estimated Peaking Capacity Sales	
Winter 1986-87	48,000
Summer 1987	100,000
Estimated Revenue	$ 91,000,000

Lower Basin
Water Year 1986

The total energy delivery to the Hoover allottees during the 1986 operating year (June 1, 1985 - May 31, 1986) was 8,225,849,728 kilowatt-hours (kWh). Of that amount, 4,316,329,728 kWh was secondary energy in excess of contract defined firm energy.

The remote control operation of Davis and Parker Powerplants, which first began during water year 1982, continued without event. These generator units are computer operated from the Department of Energy's Phoenix Dispatch Office, using hourly gate opening and megawatt schedules input and modified by Reclamation's Water Scheduling Branch in Boulder City, Nevada.

A contract was awarded in water year 1985 for modification and repair work in both the Nevada and Arizona spillway tunnels at Hoover Dam. The work will consist of construction of slotted ring air-inducing devices in the inclined sections of the spillway tunnels and the repair of tunnel concrete lining. Work on the Nevada spillway began in October 1985 and was completed August 1986. The Arizona spillway work is scheduled to be completed in water year 1987.

Scheduled maintenance at Hoover Dam for water year 1986 included normal replacements of stators, thrust bearings, water pipes, and transformers.

Water Year 1987

In operation studies of Lake Mead and Lake Powell for the Hoover operating year, which ends May 31, 1987, the amounts released at Hoover Dam have been projected to satisfy both downstream water requirements, including diversions by MWD, while also complying with the overall requirements to meet Compact, flood control, and operating criteria release provisions. The water scheduled to be released will generate 100 percent of contract defined firm energy, plus secondary energy. The estimated monthly Hoover releases during the operating year total 15.2 MAF. It is estimated that generation from these Hoover releases, along with the Hoover to Parker-Davis interchange, will result in delivery to the allottees of about 7.3 billion kWh of electrical energy. A $7,637,385 Reclamation contract has been awarded for uprating generators N-3 and N-4 at Hoover Dam in Nevada. The contract was awarded to General Electric Company of Denver, Colorado. Work will begin in 1987 and is scheduled to be completed in 1987.

Principal work under the contract includes conducting a study of the existing generator design, furnishing and installing necessary new components, and modifying the two generators, as required to accomplish the proposed uprating. The objective is to uprate the generators by the optimum amount, based on water availability and economic feasibility. Studies show that sufficient water, head, and turbine capacity are available to produce significantly more generator output than the existing generator ratings will allow. The generators were manufactured by Westinghouse. Generator N-3 was installed in 1937 and generator N-4 in 1936.

An additional $10,620,722 contract has been recently awarded, also to the General Electric Company of Denver, Colorado, to uprate generating units A1, A2, A6, and A7 at Hoover Dam in Arizona. After starting work on those units, the contractor will have 2 years to complete the job. Upon completion of this contract, 8 of the 17 generating units in the powerplant will have been uprated.

The Hoover Uprating Program was authorized by the Hoover Powerplant Act of 1984 (Act), which finalized a historic three-State agreement on the marketing of Hoover power after the current contracts terminate on June 1, 1987. The Act also requires that the Hoover Uprating Program be undertaken with funds advanced by the non-Federal purchasers of Hoover power.

Scheduled for completion in 1992, the Hoover Uprating Program will be funded with an estimated $126 million from non-Federal sources in Arizona, California, and Nevada. Arizona and Nevada will each fund about 37 percent of the costs, with the remainder being financed by nine municipalities in southern California.

The Hoover Uprating Program will result in a generation increase to an anticipated output exceeding 2,000 megawatts.