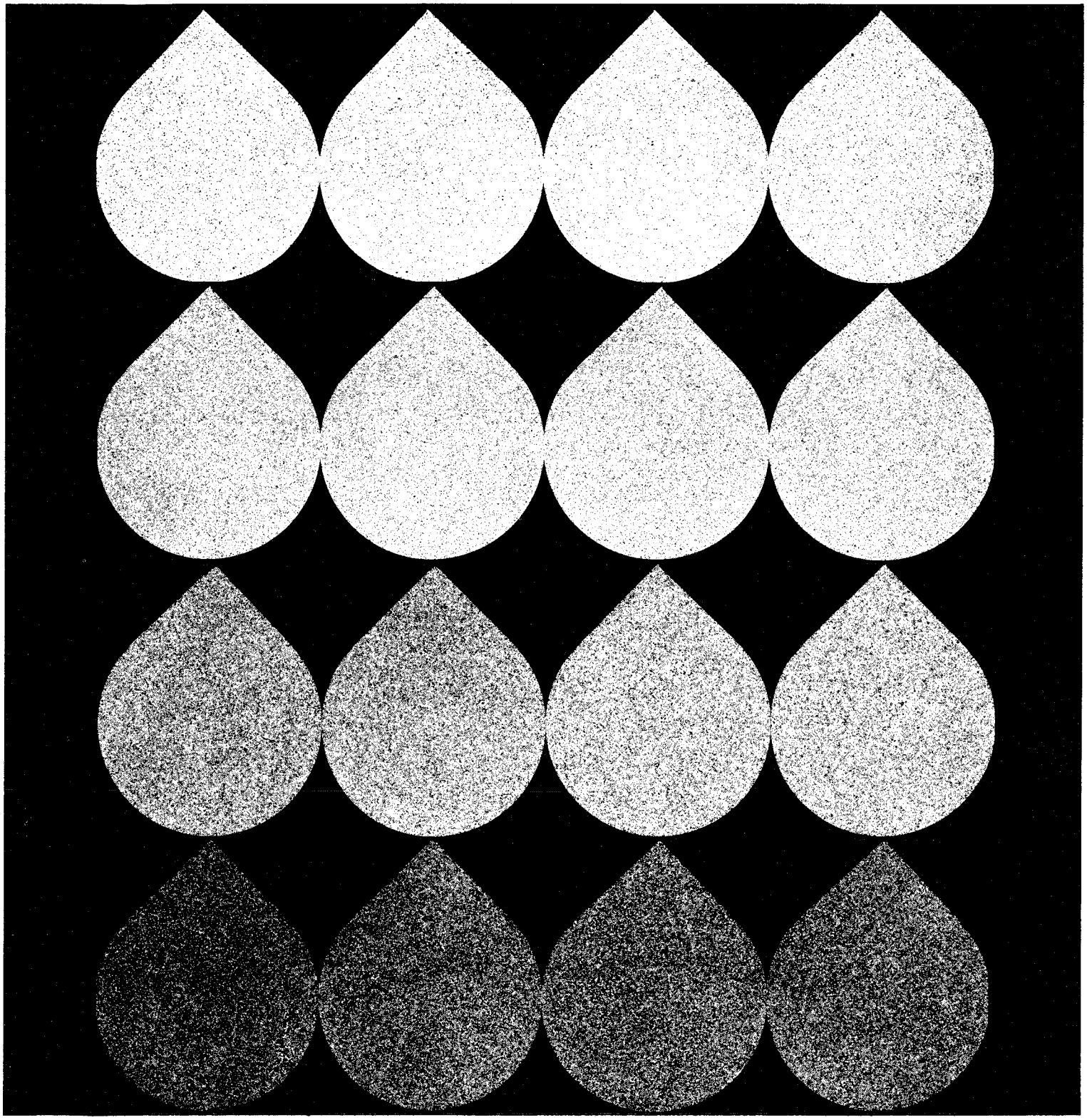
11th Annual Report

Operation of the Colorado River Basin 1981 Projected Operations 1982



Colorado River Basin

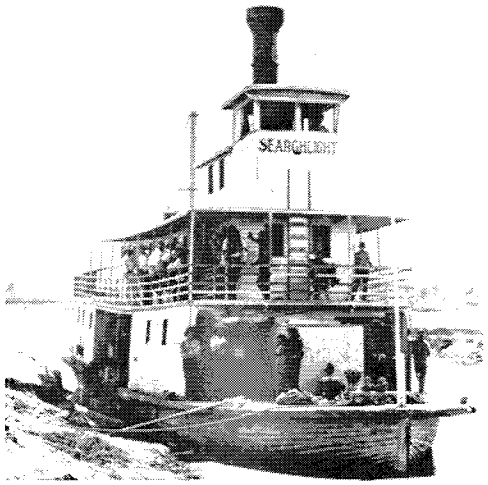
Contents

U.S. Department of the Interior

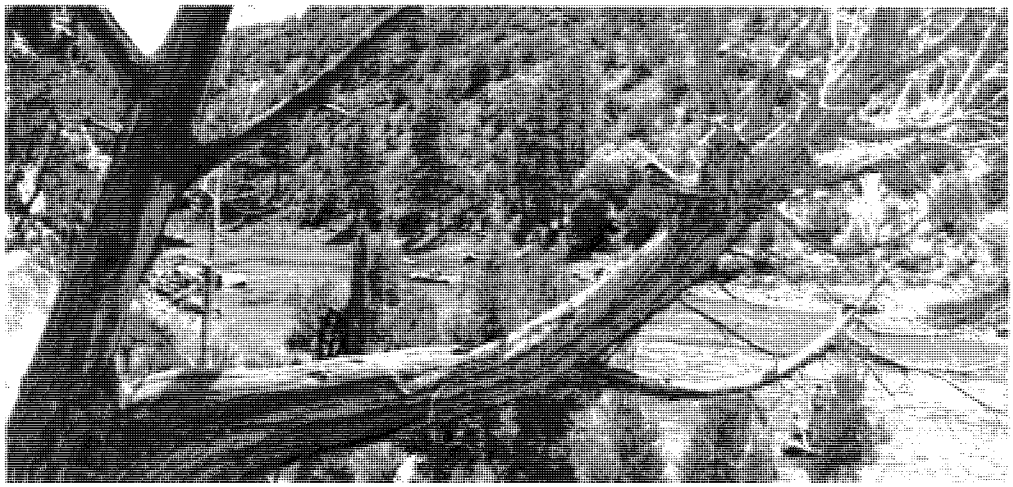
Bureau of Reclamation

January 1982

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

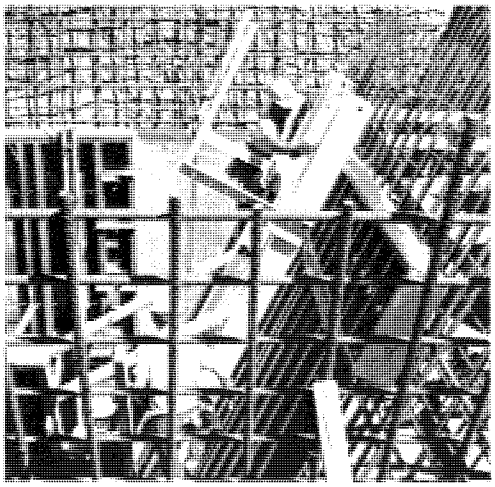


Searchlight Steamer above the Salton Sea Damsite (1906).



Branches frame leisurely float trip.

Introduction



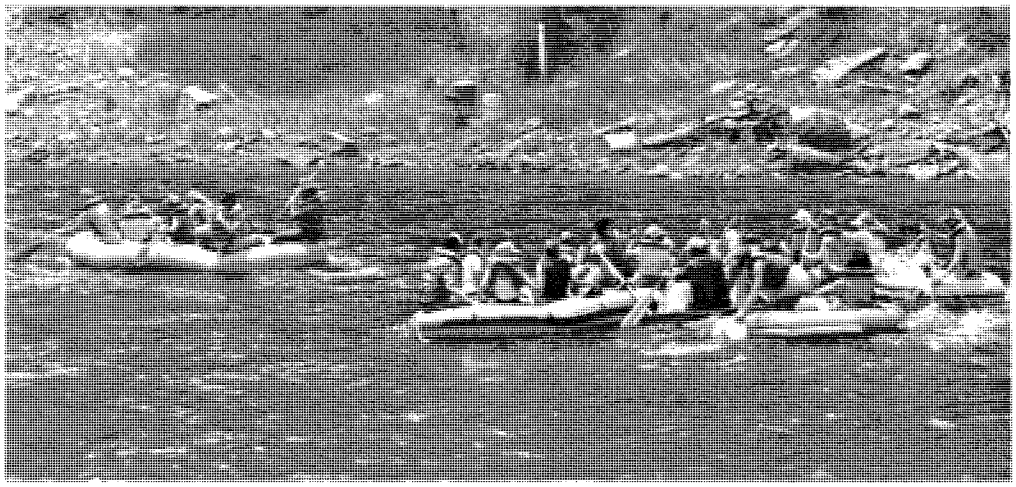
Concrete forms on the Havasu Pumping Plant.

The operation of the Colorado River Basin during the past year and the projected operations for the current year reflect domestic use, irrigation, hydroelectric power generation, flood control, 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 Sec. 602(a) of 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), or the Colorado River Basin Project Act (82 Stat. 885; 43 U.S.C. 1501).

Authority for Report



Raft race on the Green River.

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 eleventh 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 1981 and the projected operation of these reservoirs during water year 1982 under the "Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs," published in the Federal Register June 10, 1970.

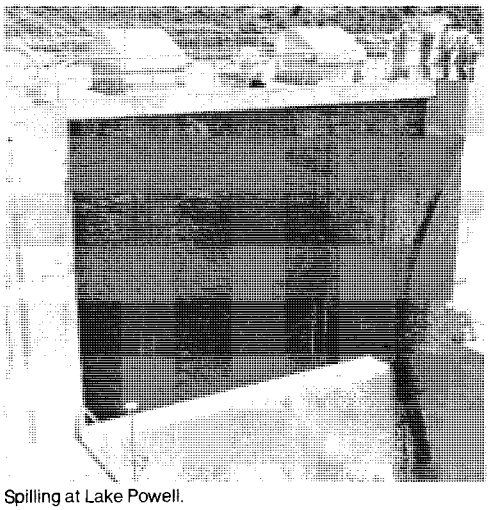
James G. Watt, Secretary
U.S. Department of the Interior

Actual Operations Under Criteria — Water Year 1981

The initial operational plan for water year 1981, assuming average runoff conditions, reflected the concepts of equalization of storage between Lake Powell and Lake Mead and anticipatory releases from Lake Mead for flood control and river regulation purposes. However, beginning in November 1980, precipitation at the 13 selected stations dropped below normal and continued this decline throughout the year. In view of the January forecast of below normal April-July runoff and projected reservoir conditions, the operating plan was modified to provide for minimum releases from Lake Powell and reduced releases from Hoover to meet downstream requirements.

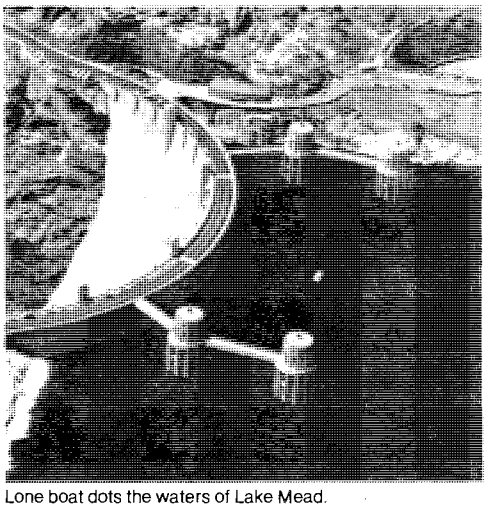
During water year 1981, the water supply in the Colorado River Basin was approximately 49 percent of the long-term average, ranging from 58 percent for the Green River above Flaming Gorge Dam to 49 percent for the San Juan River above Navajo Dam. The major storage reservoirs in the Colorado River Basin stayed within the normal operating range during water year 1981. Aggregate Colorado River system storage at the end of the water year was 49,573,000 acre-feet, representing a decrease of 4,941,000 acre-feet from the previous year. Despite the extremely low runoff, active storage in the system was approximately 88 percent of the January 1 maximum available storage, due to the large carryover from previous years.

Projected Plan of Operation Under Criteria — Water Year 1982



Spilling at Lake Powell.

On September 30, 1981, the active content of Lake Powell was 20,751,000 acre-feet and the storage at Lake Mead was 21,870,000 acre-feet. Releases from Lake Powell amounted to 8,295,000 acre-feet. By the end of the water year, the goals of the 1981 operation plan for the major storage reservoirs in the system had been achieved.

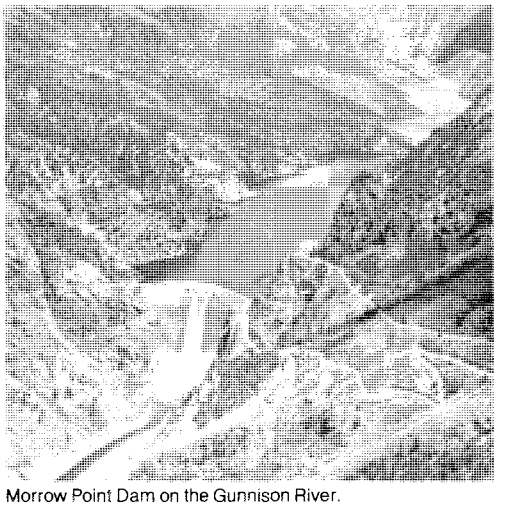


Lone boat dots the waters of Lake Mead.

Determination of "602(a) Storage"
Sec. 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 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" 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; (f) the necessity to assure that Upper Basin consumptive uses are not impaired because of failure to store sufficient water to assure



Morrow Point Dam on the Gunnison River.

deliveries under Sec. 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, 1982, 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, before the beginning of each calendar year.

Additional Releases Water Year 1981

Parker Dam and Powerplant.

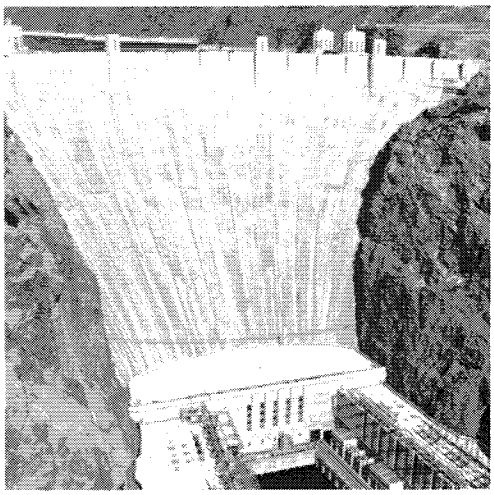
Upon 30 days advance notice to the United States Section, Mexico has the right to modify, within the total schedule, any monthly quantity prescribed by the schedule by not more than 20 percent. During water year 1981, Mexico received a total delivery of about 3,622,000 acre-feet at the Northerly International Boundary. Of that amount, it is estimated that about 379,000 acre-feet was attributable to Gila River inflow (as measured at the gage near Dome, Ariz.) and the remainder, about 3,243,000 acre-feet, was released from the Colorado River mainstem reservoirs. The Gila River inflow to the Colorado is a combination of flood control releases from Painted Rock Dam and irrigation return flows.

Of the 3,243,000 acre-feet of mainstem Colorado River water reaching the boundary, about 2,224,000 acre-feet was delivered through Pilot Knob Powerplant wasteway from the All-American Canal. An estimated 658,000 acre-feet was released through Laguna Dam. The remainder of the flow at the Northerly International Boundary 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.

The United States will make scheduled deliveries of 1,500,000 acre-feet of Colorado River water to the Republic of Mexico in calendar year 1982. Representatives of the Republic of Mexico will be kept informed of operating schedules through the United States Section of the Commission.

Regulatory Wastes

Deliveries to Mexico consist of river water delivered to Imperial Dam and waste and drainage return flows from water users below Imperial Dam. In addition to assuring normal water deliveries, the small amount of regulatory storage space in Imperial, Laguna, and Senator Wash Reservoirs was used at times to limit potential downstream flood damages during water year 1981. Regulatory waste for water year 1982 will depend on the actual hydrologic conditions occurring during that time.



Hoover Dam from a visitor's viewpoint.

On April 10, 1980, a meeting of Federal, State, and basin interests to discuss "Colorado River Basin Water Conditions" and proposed plans for reservoir operations was held in Las Vegas, Nev. The principal subject of discussion at that meeting was the proposed release of an average of 19,000 cubic feet per second from Parker Dam, beginning May 1, 1980, and continuing through December 31, 1980, in order to avoid making future flood-condition releases and coincidentally, to optimize power generation.

This plan of operation, including the further additional releases, was implemented consistent with the operational strategy approved by the Assistant Secretary of the Interior in 1979. During water year 1981, the additional Hoover releases totaled approximately 1,177,000 acre-feet. No additional releases were made after January 1981.

Projected Plan of Operation — Water Year 1982

Mountain snow holds future runoff.

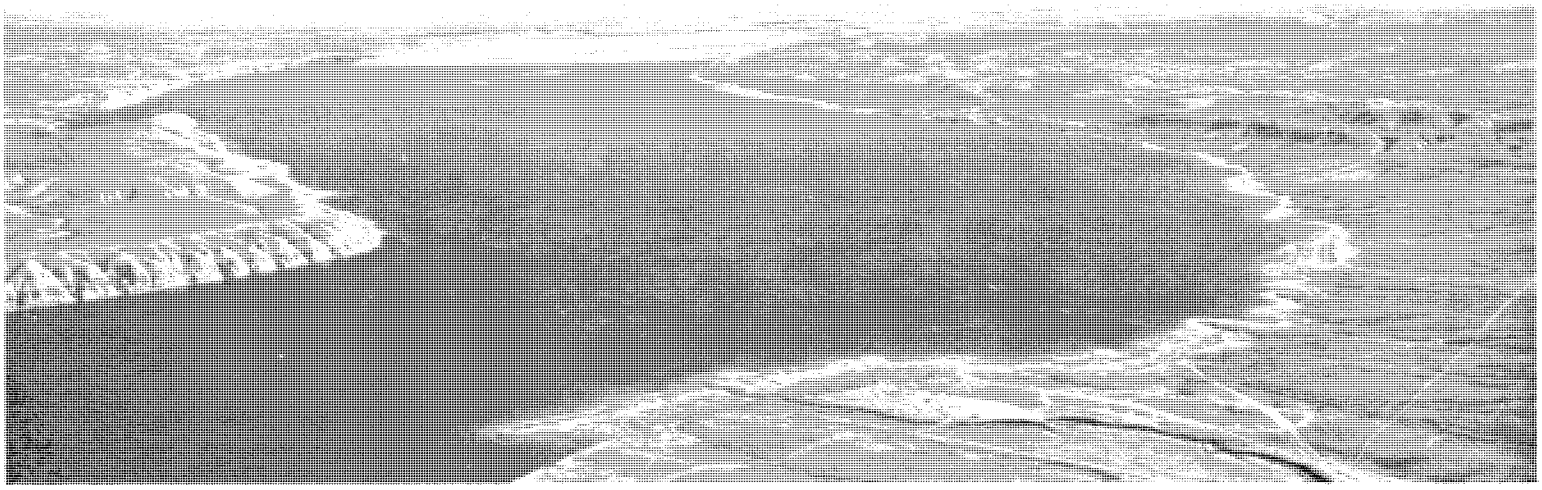
Pipe for the Havasu Pumping Plant discharge line.

A proposed operation plan for water year 1982 for the Colorado River reservoir system was formulated and distributed to representatives of the Colorado River Basin States during November 1981. The plan was prepared in accordance with the operating criteria published June 4, 1970, in compliance with Sec. 602, Public Law 90-537. The plan reflects domestic use, irrigation, hydroelectric power generation, water quality control, flood control, fish and wildlife propagation, recreation, and Colorado River Compact requirements.

On September 30, 1981, storage in Lake Powell was 1.1 million acre-feet less than the storage in Lake Mead. Therefore, the proposed operation plan for average runoff conditions is based on a release from Lake Powell of 8.23 million acre-feet. At the end of water year 1982, storage in Lake Powell will be equal or less than the storage in Lake Mead with this minimum objective release. The 1982 operating plan for average, most adverse, lower and upper quartile conditions calls for releases from Lake Mead limited to satisfying minimum downstream consumptive use requirements only.

The projected operation for average runoff conditions for each reservoir in the Colorado River Basin for water year 1982 is described in the following pages. Charts 1-8 show the projected monthly outflows from the reservoirs, the projected end-of-month elevation, and active storage in the reservoirs for average and also three other assumptions of the 1982 modified runoff from the basin. The four assumptions are: (1) Average based on the 1906-80 record runoff; (2) Upper quartile based on the level of annual streamflow which has been exceeded 25 percent of the time during 1906-80; (3) Lower quartile based on flows exceeded 75 percent of the time during 1906-80; and (4) Most adverse based on the lowest year of record, which was 1977.

Upper Basin Reservoirs
Fontenelle Reservoir
(Green River)



On shore of Fontenelle Reservoir looking downstream.

Water Year 1981
Fontenelle Reservoir is operated for power generation, water supply, flood control, fish and wildlife enhancement, and recreation. The water surface was gradually lowered from an elevation of 6,500 feet at the beginning of the water year to a low of 6,482 feet in May 1981. By mid-July the reservoir elevation came within two-tenths of a foot of filling.

The minimum release during the fall and winter was 700 ft^3/s. The maximum release for the water year was 1,775 ft^3/s. The maximum inflow of 7,937 ft^3/s occurred on June 11. The minimum release for power generation is 500 ft^3/s; the maximum release through the powerplant is 1,750 ft^3/s at rated head. A total of 792,000 acre-feet was released from the reservoir with only 3,000 acre-feet by-passing the powerplant.

Water Year 1982
At the beginning of water year 1982, the elevation at Fontenelle Reservoir was 6,493 feet with a content of 245,000 acre-feet. Releases from the reservoir, assuming average runoff conditions, will be scheduled to draw the water down to 6,479 feet prior to the spring runoff.

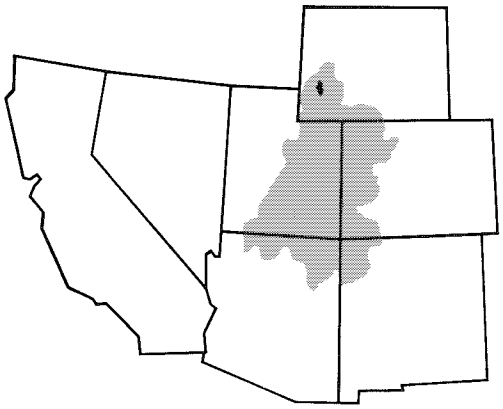
The reservoir is scheduled to fill in June 1982 unless the inflow is considerably less than average. After the spring runoff, the reservoir level will be controlled by adjusting the releases through the powerplant to gradually reduce the elevation to 6,504 feet by the end of the summer of 1982.

The maximum release is dependent primarily on the magnitude of the inflow. If the inflow is in the upper quartile, peak outflow is expected to be less than 10,000 ft^3/s. With an average inflow, the anticipated peak outflow is less than 5,000 ft^3/s. Assuming a lower quartile inflow, the outflow will probably be no greater than 3,000 ft^3/s.

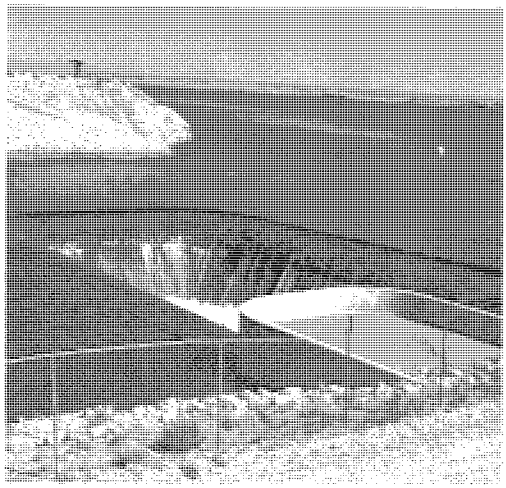
Fontenelle Active Storage* **Chart 1**

Reservoir	(Acre-Feet)	El.(Ft.)
Maximum Storage	344,834	6506
Rated Head	233,789	6491
Minimum Power	194,962	6485
Surface Area (Full)	8058 Acres	
Reservoir Length (Full)	18 Miles	
Power Plant		
Number of Units	1	
Total Capacity	10,000 Kilowatts	

*does not include 563 acre-feet of dead storage below 6408 feet



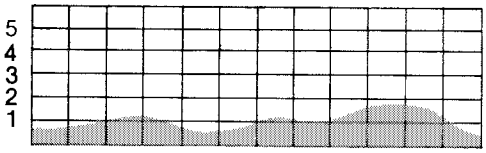
Tubing at Fontenelle Creek recreation site.



Fontenelle Dam spillway intake.

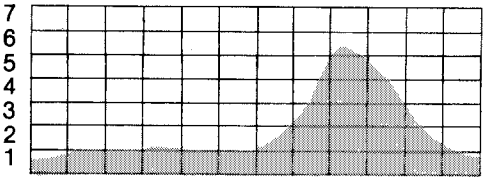
Outflow Release in 1000 Cubic Feet/Second

Actual Operation 1981

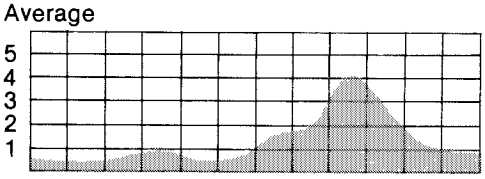


Projected Operation 1982

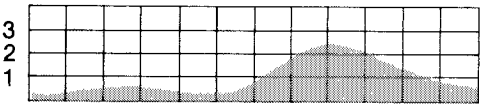
Upper Quartile



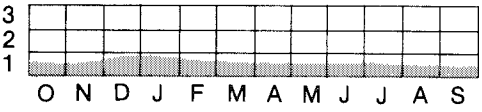
Average



Lower Quartile



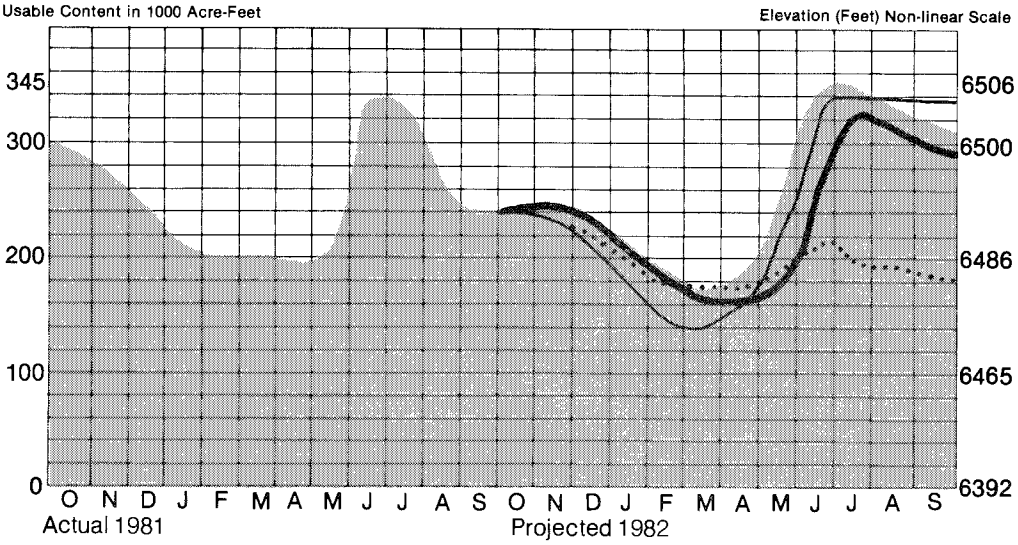
Most Adverse



Storage

Usable Content in 1000 Acre-Feet

Elevation (Feet) Non-linear Scale



Legend

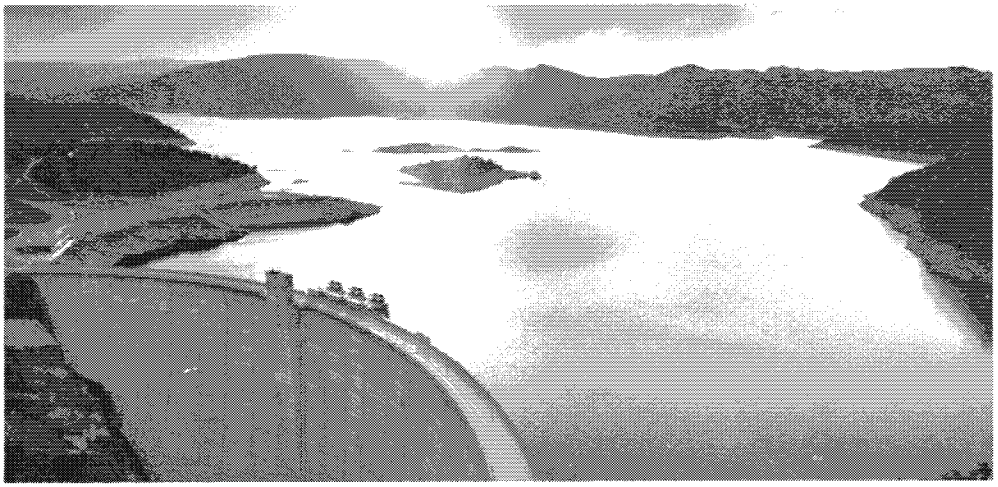
Most Probable

Upper Quartile

Lower Quartile

Most Adverse

Flaming Gorge Reservoir (Green River)



Setting sun reflects off Flaming Gorge Lake.

Three selective withdrawal structures.

Water Year 1981
At the beginning of water year 1981, the reservoir water surface elevation was 6,023 feet with a content of 3,076,800 acre-feet. Prior to the spring runoff the reservoir elevation was drawn down to 6,019 feet. The April through July 1981 runoff above Flaming Gorge was 576,000 acre-feet, 50 percent of the long-term average. With this runoff, the reservoir reached its seasonal maximum elevation of 6,021 feet with a content of 3,027,000 acre-feet by mid-July. By the end of September, the elevation was 6,018 feet with a content of 2,916,800 acre-feet.

The normal minimum release at Flaming Gorge Reservoir is 800 ft^3/s. The maximum release through the powerplant is 4,600 ft^3/s at rated head. During the water year, a total of 1,063,000 acre-feet was released through the powerplant.

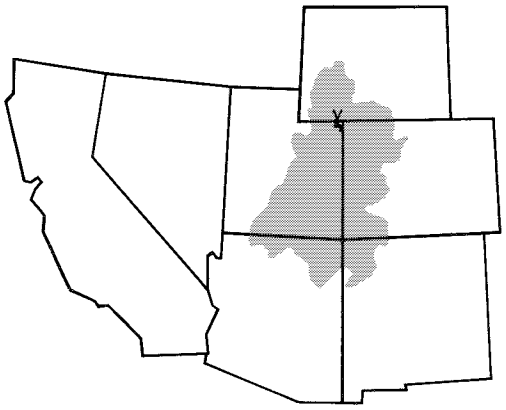
Water Year 1982
During water year 1982, the reservoir level at Flaming Gorge is projected to be drawn from 6,018 feet to about 6,013 feet before the spring of 1982. The water level should remain high enough to launch boats from the reservoir's nine ramps. Average inflow would result in a maximum elevation of 6,027 feet with a storage of 3,247,000 acre-feet during July.

Since there are both enough storage space for a high inflow and enough stored water in case of a low inflow, releases from Flaming Gorge are not dependent on inflow for water year 1982, but rather on the demand for electric power and the availability of energy for purchase and exchange.

Flaming Gorge Reservoir — Active Storage* (Acre-Feet) — **Chart 2**

		El. (Ft.)
Maximum Storage	3,749,000	6040
Rated Head	1,062,000	5946
Minimum Power	233,000	5871
Surface Area (Full)	42,020 Acres	
Reservoir Length (Full)	91 Miles	
Power Plant		
Number of Units	3	
Total Capacity	108,000 Kilowatts	

*does not include 40,000 acre-feet of dead storage below 5740 feet

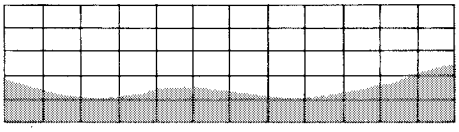


Scenic view of Flaming Gorge Lake.

Rafting the Green River below Flaming Gorge Dam.

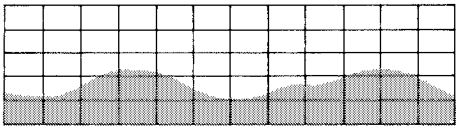
Outflow Release in 1000 Cubic Feet/Second

Actual Operation 1981

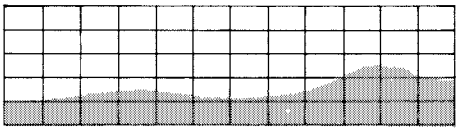


Projected Operation 1982

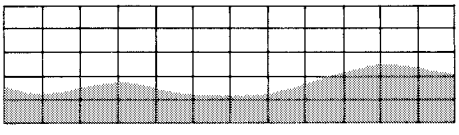
Upper Quartile



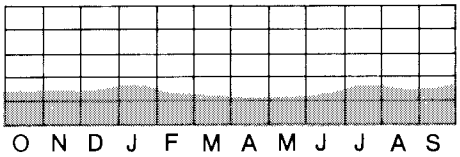
Average



Lower Quartile



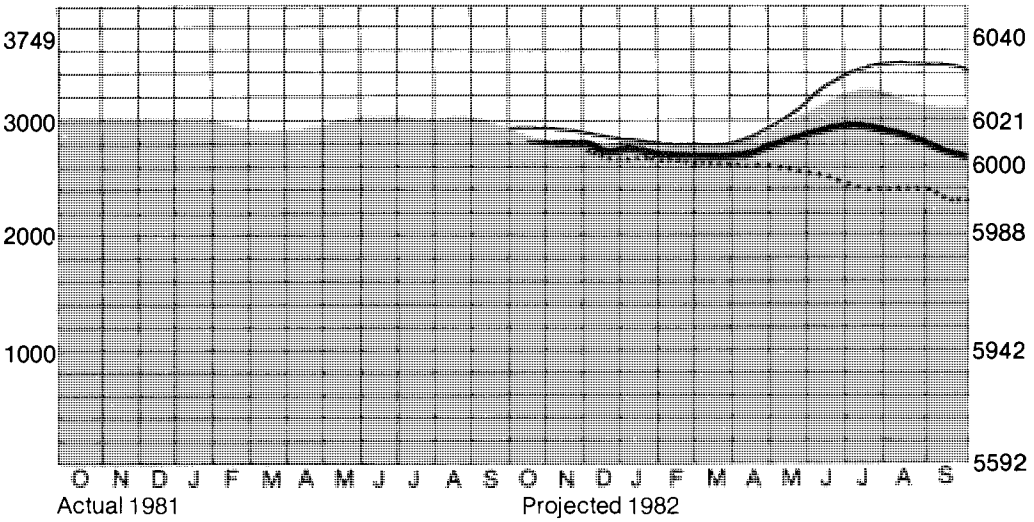
Most Adverse



Storage

Usable Content in 1000 Acre-Feet

Elevation in Feet (Non-Linear Scale)



Actual 1981 Projected 1982

Legend

Most Probable

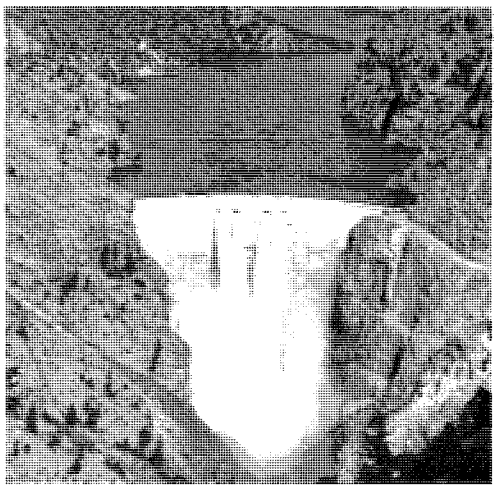
Upper Quartile

Lower Quartile

Most Adverse

Wayne N. Aspinall Unit (Gunnison River)
Blue Mesa Reservoir
Morrow Point Reservoir
Crystal Reservoir

Wayne N. Aspinall and wife at dedication of the storage unit's new name.



Morrow Point Dam completed in 1970.

Water Year 1981

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

At the end of September 1980, Blue Mesa Reservoir contained 738,000 acre-feet of active storage with a water surface elevation of 7,509 feet. The April through July 1981 runoff above Blue Mesa was 283,000 acre-feet, 37 percent of the long-term average. The water surface elevation of Blue Mesa reached a maximum of 7,470 feet in June 1981, with a storage of 433,000 acre-feet. No water by-passed the powerplant during water year 1981.

The draw-down for power operations and river regulation was great enough that no further space evacuation for flood control was required.

During water year 1981, all flows in the Gunnison River below the Gunnison Tunnel were greater than 200 ft^3/s, the minimum discharge required to protect the fishery in the river.

Water Year 1982

Assuming average inflow for water year 1982, Blue Mesa Reservoir is expected to reach a low of 7,439 feet with an active storage of approximately 255,000 acre-feet in March. The projected maximum level is 7,509 feet with an active storage of 735,000 acre-feet.

Morrow Point Reservoir will operate at or near its capacity during the current year. Crystal Reservoir will also operate nearly full except for daily fluctuations needed in regulating the releases from Morrow Point and to meet downstream requirements for fish habitat and diversions through the Gunnison Tunnel.

Assuming average, or greater runoff conditions, releases from Crystal Reservoir will be maintained between 750 ft^3/s and 2,000 ft^3/s. Under lower quartile runoff conditions, or less, releases will range from the minimum of 200 ft^3/s to a maximum of 1,200 ft^3/s.

Blue Mesa Active Storage* **Chart 3**

Reservoir	(Acre-Feet)	El.(Ft.)
Maximum Storage	829,523	7519
Rated Head	249,395	7438
Minimum Power	81,070	7393
Surface Area (Full)	9,180 Acres	
Reservoir Length (Full)	24 Miles	
Power Plant		
Number of Units	2	
Total Capacity	60,000 Kilowatts	

*does not include 111,232 acre-feet of dead storage below 7358 feet

Morrow Point Active Storage*

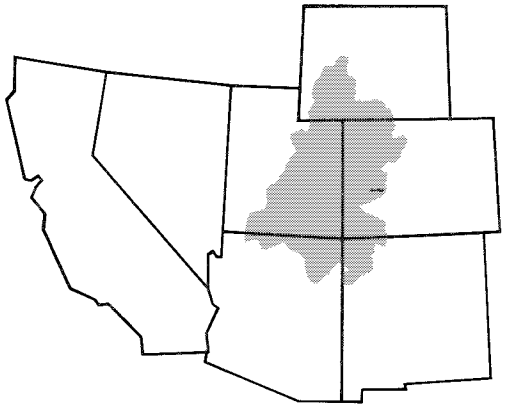
Maximum Storage	117,025	7160
Rated Head	79,805	7108
Minimum Power	74,905	7100
Surface Area (Full)	817 Acres	
Reservoir Length (Full)	11 Miles	
Power Plant		
Number of Units	2	
Total Capacity	120,000 Kilowatts	

*does not include 165 acre-feet of dead storage below 6808 feet

Crystal Active Storage*

Maximum Storage	17,573	6755
Rated Head	13,886	6742
Minimum Power	10,619	6729
Surface Area (Full)	301 Acres	
Reservoir Length (Full)	7 Miles	
Power Plant		
Number of Units	1	
Total Capacity	28,000 Kilowatts	

*does not include 8,200 acre-feet of dead storage below 6670 feet

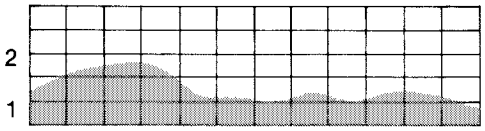


Peaceful majesty of Crystal Dam.

Aerial view of Blue Mesa Dam and Reservoir.

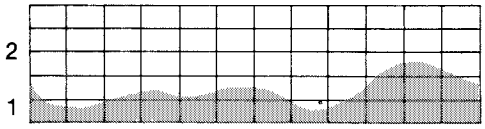
Outflow Blue Mesa Reservoir

Actual 1981 Release in 1000 Cubic Ft/Sec

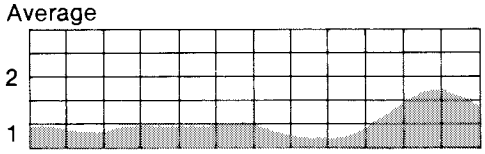


Projected Operation 1982

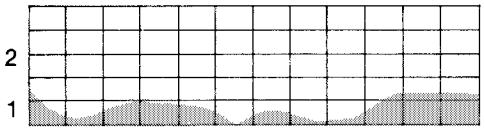
Upper Quartile



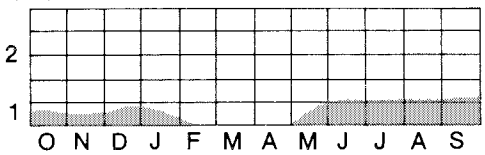
Average



Lower Quartile



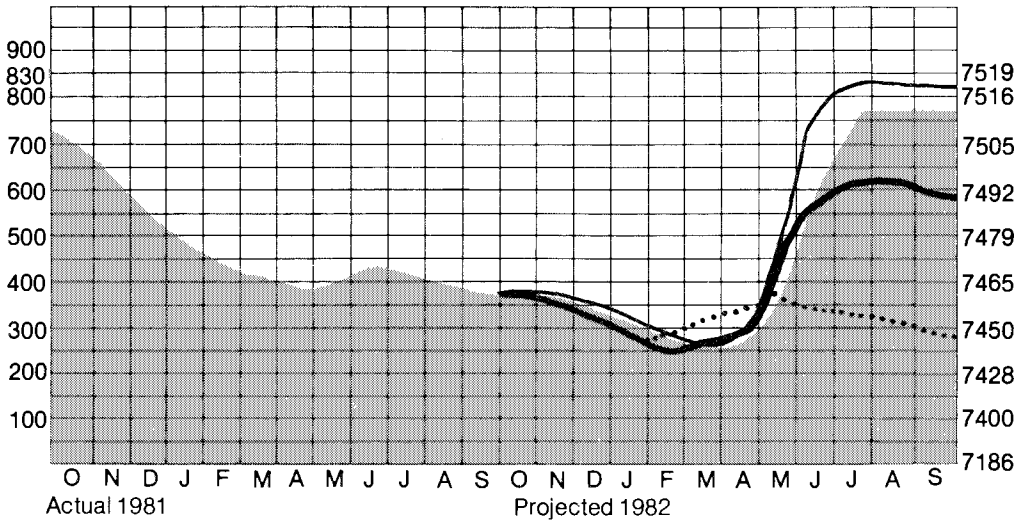
Most Adverse



Storage Blue Mesa Reservoir

Usable Content in 1000 Acre-Feet

Elevation in Feet (Non-Linear Scale)



Legend

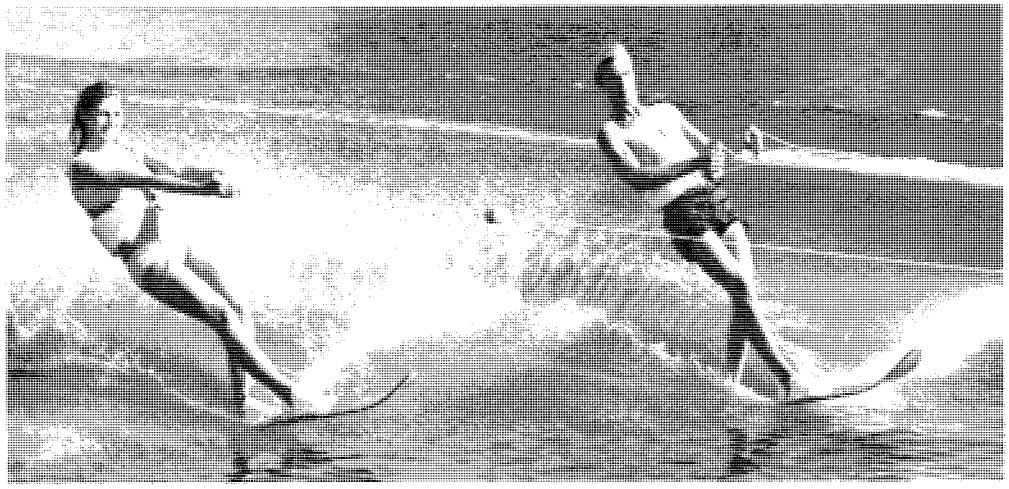
Most Probable

Upper Quartile

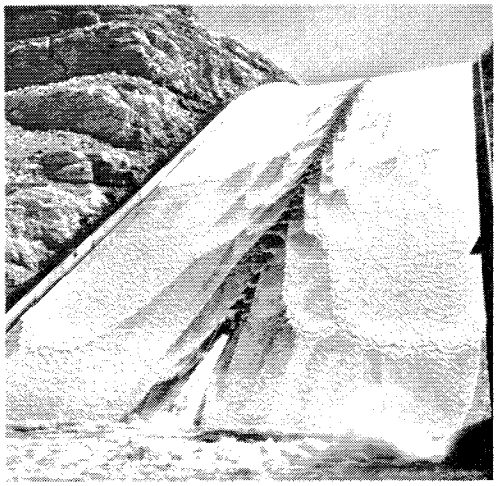
Lower Quartile

Most Adverse

Navajo Reservoir
(San Juan River)



Skiing Navajo Reservoir.



Navajo Dam spillway.

Water Year 1981
During the first part of water year 1981, a minimum 530 ft³/s was released for consumptive use and maintenance of fish and wildlife.

The April-July 1981 inflow was 320,000 acre-feet, which is 45 percent of the long-term average. During the water year, the maximum inflow of 3,670 ft³/s occurred on June 11.

At the beginning of the water year, the reservoir elevation was 6,075 feet. It gradually was drawn down to 6,050 feet prior to the spring runoff. The water surface reached its highest elevation of 6,060 feet during June 1981.

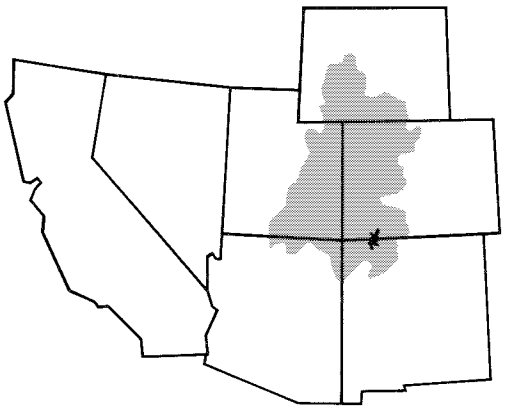
Water Year 1982
On September 30, 1981, Navajo Reservoir stored 1,248,000 acre-feet of water at an elevation of 6,052 feet. Assuming average inflow for water year 1982, the projected elevation before snowmelt runoff begins is 6,050 feet with a content of 1,221,000 acre-feet. By July 1982, the reservoir is expected to reach an elevation of 6,074 feet with a content of 1,534,000 acre-feet. This approximate elevation will be maintained throughout the summer to enhance recreational use.

Releases from Navajo Reservoir for an upper quartile inflow are projected to average 700 ft³/s during the winter and increase to a maximum of 2,000 ft³/s during the summer. For an average inflow, releases are expected to be about 530 ft³/s through the winter, then increase to a maximum of approximately 1,500 ft³/s during the summer. The lower quartile and most adverse releases are projected to average about 530 ft³/s throughout the water year.

Navajo Active Storage* **Chart 4**

Reservoir	(Acre-Feet)	El. (Ft.)
Maximum Storage	1,696,400	6085
Inactive Storage	660,500	5990
Surface Area (Full)	15,610 Acres	
Reservoir Length (Full)	33 Miles	

*does not include 12,600 acre-feet of dead storage below 5775 feet

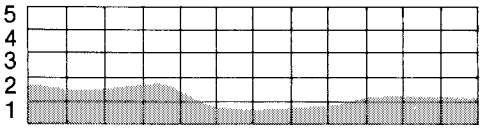


Navajo Dam spillway and Pine River Marina.

Panoramic view of Navajo Reservoir, a popular recreational area of the Southwest.

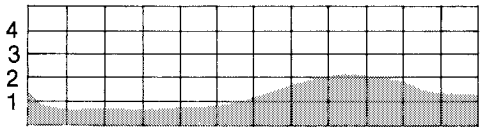
Outflow Release in 1000 Cubic Feet/Second

Actual Operation 1981

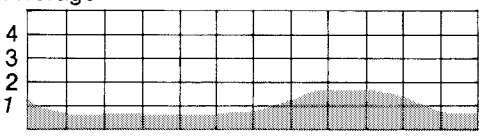


Projected Operation 1982

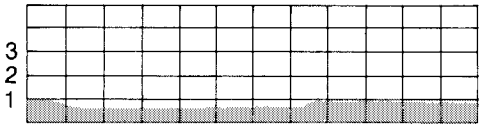
Upper Quartile



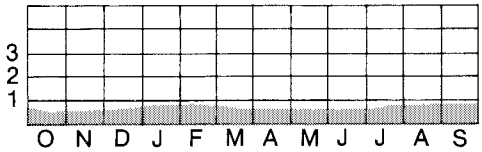
Average



Lower Quartile

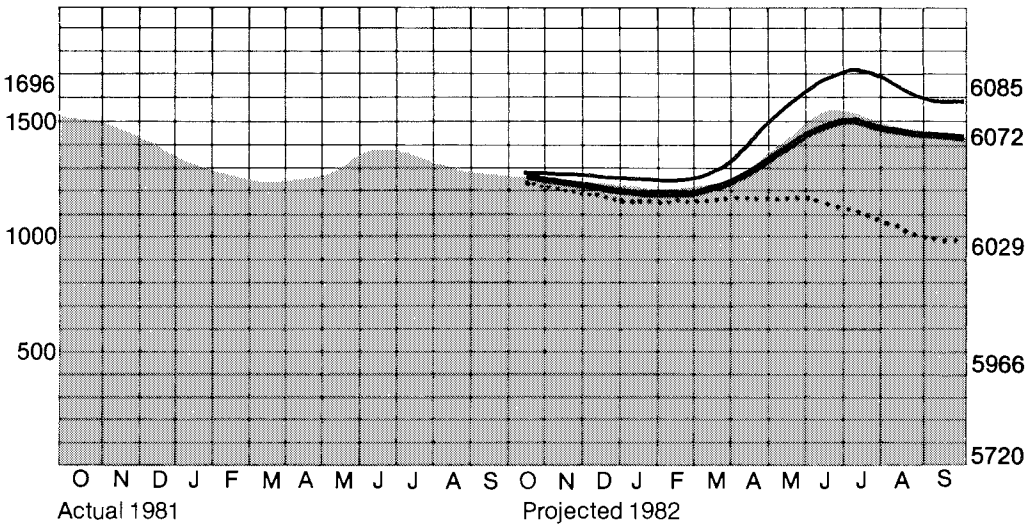


Most Adverse



Storage

Usable Content in 1000 Acre-Feet — Elevation in Feet (Non-Linear Scale)



Legend

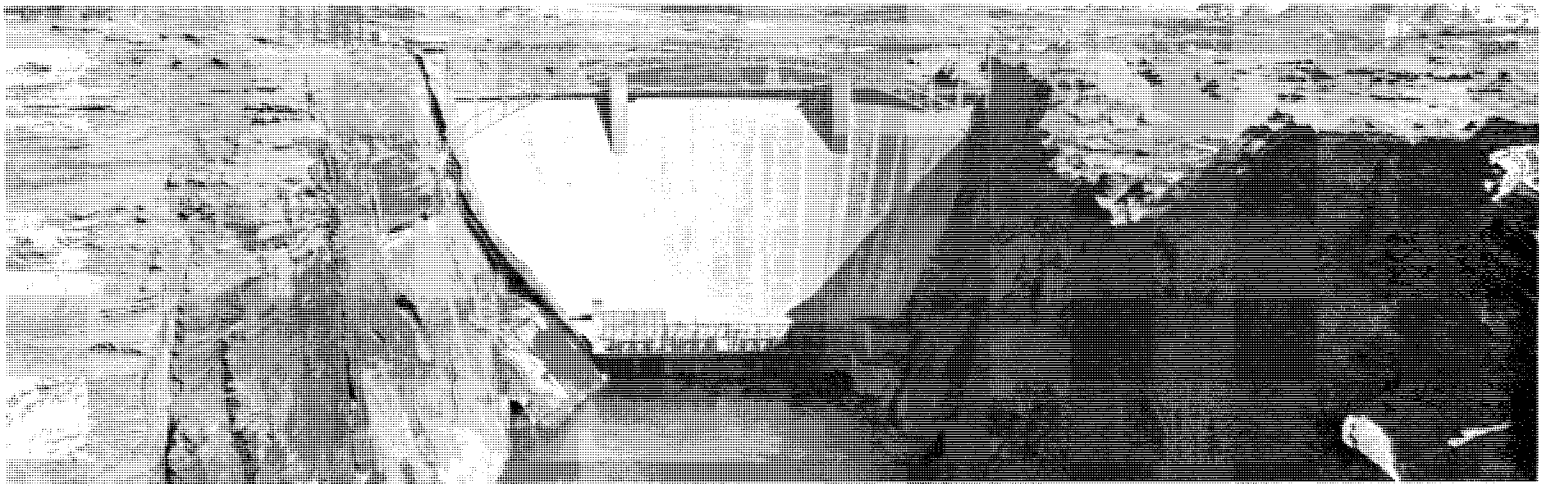
Most Probable

Upper Quartile

Lower Quartile

Most Adverse

Lake Powell (Colorado River)



Downstream view of Glen Canyon Dam and Powerplant.

Water Year 1981
During water year 1981, Lake Powell, which is impounded by Glen Canyon Dam, was operated as part of the Colorado River Storage Project in accordance with governing contracts and laws to provide river regulation, optimum power production, recreation, and fish and wildlife enhancement.

On September 30, 1980, the Lake Powell water surface elevation was 3,688 feet with an active storage of 23,083,000 acre-feet. The April-July 1981 runoff above Lake Powell was approximately 41 percent of the long-term average. The water surface elevation was drawn down to 3,677 feet prior to the spring runoff, and attained a maximum seasonal level of 3,681 feet by July 1981. Total releases from Lake Powell amounted to 8,295,000 acre-feet.

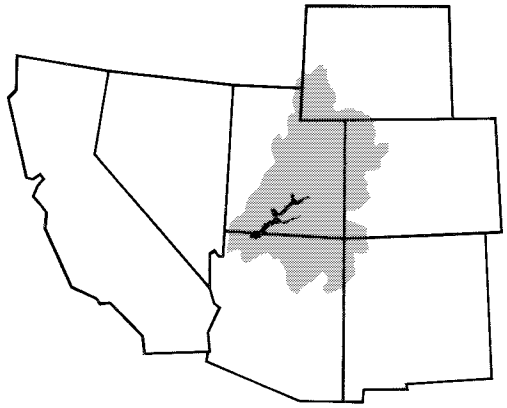
Water Year 1982
By the end of September 1981, the elevation of Lake Powell was 3,672 feet with a content of 20,751,000 acre-feet. Under average runoff conditions the elevaion is expected to be drawn down to about 3,662 feet by the spring of 1982, and reach a maximum elevation of 3,684 feet by the end of July. At this elevation, the content is 22.4 million acre-feet, 90 percent of active capacity, and the surface area is approximately 149,500 acres.

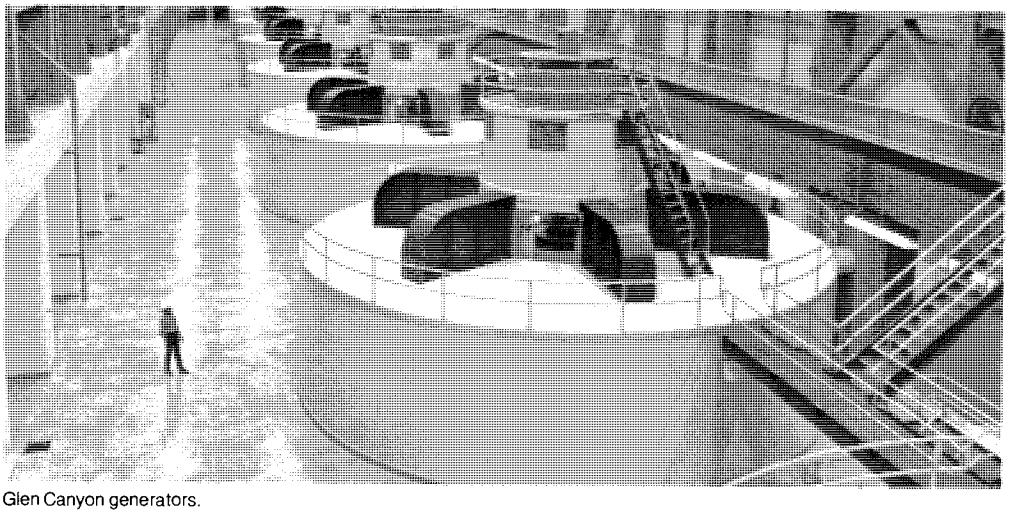
Assuming average inflow conditions and minimum releases from Lake Powell, the storage in Lake Powell will remain less than the storage in Lake Mead throughout water year 1982. Therefore, the proposed operation plan for average inflow is based on a release from Lake Powell of 8,230,000 acre-feet. With an upper quartile inflow, releases are projected to total 9,300,000 acre-feet.

Lake Powell Active Storage* **Chart 5**

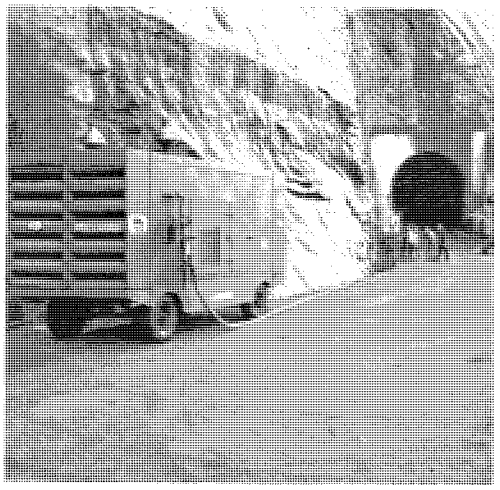
Reservoir	(Acre-Feet)	El. (Ft.)
Maximum Storage	25,002,000	3700
Rated Head	9,428,000	3570
Minimum Power	4,126,000	3490
Surface Area (Full)	161,390 Acres	
Reservoir Length (Full)	186 Miles	
Power Plant		
Number of Units	8	
Total Capacity	1,021,000 Kilowatts	

*does not include 1,998,000 acre-feet of dead storage below 3370 feet





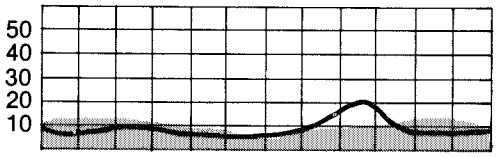
Glen Canyon generators.



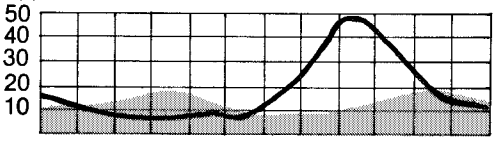
Rehabilitation at Glen Canyon Powerplant tunnel.

Inflow **Outflow**

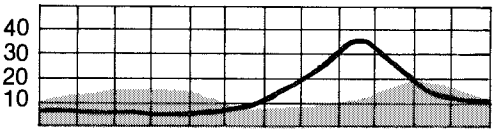
Actual 1981 in 1000 Cubic Feet/Second



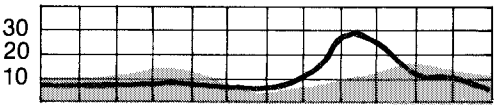
Projected 1982
Upper Quartile



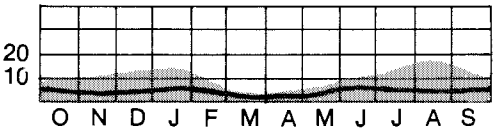
Average



Lower Quartile



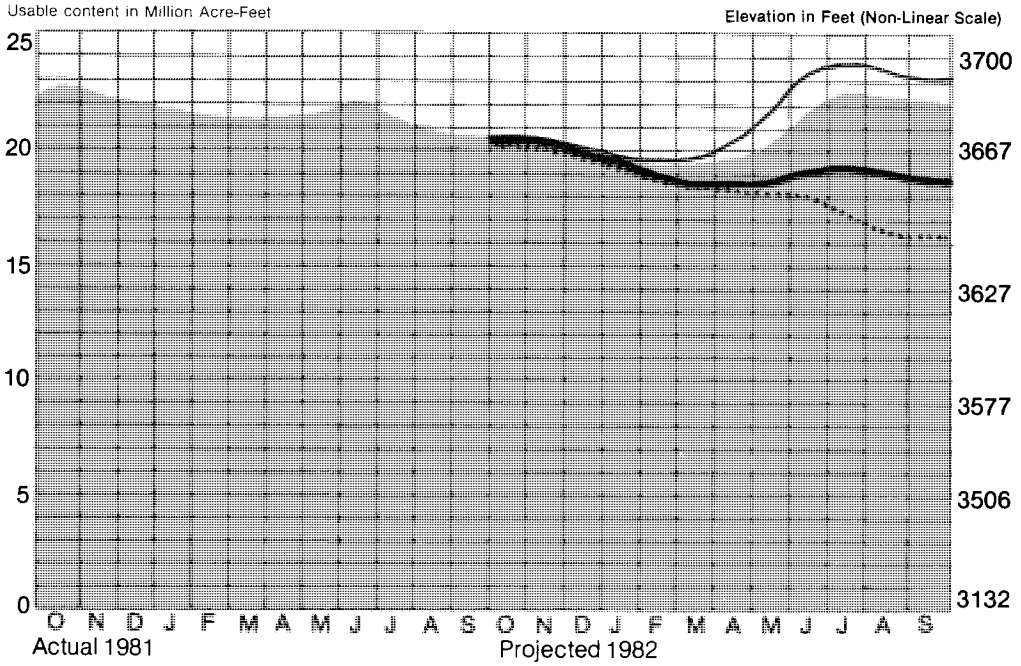
Most Adverse



Storage

Usable content in Million Acre-Feet

Elevation in Feet (Non-Linear Scale)

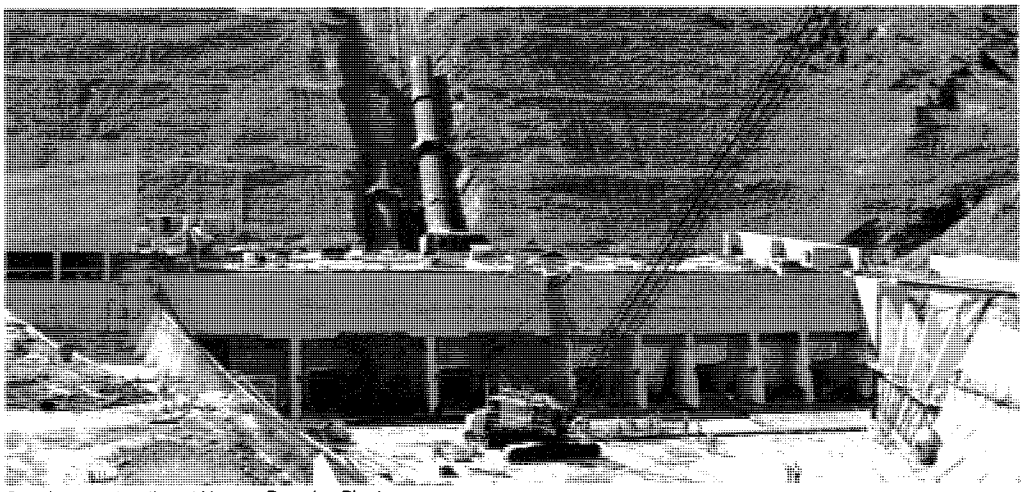


Legend

Most Probable
Upper Quartile
Lower Quartile
Most Adverse

Lower Basin Reservoirs
Lake Mead (Colorado River)

Tourists in ticket line at Hoover Dam.



Ongoing construction at Havasu Pumping Plant.

Water Year 1981
At the beginning of water year 1981, Lake Mead, impounded by Hoover Dam, had a water surface elevation of 1,205 feet and an active storage of 23,637,000 acre-feet. During the water year, releases were made to meet downstream water use requirements in the United States and Mexico, programmed levels of Lakes Mohave and Havasu, and transit losses which include river and reservoir evaporation, uses by phreatophytes, changes in bank storage, unmeasured inflows, and diversions. (As mentioned earlier in this report, additional anticipatory releases, totaling approximately 1,177,000 acre-feet, were made from Hoover Dam and downstream reservoirs during water year 1981 in order to decrease the magnitude of potential flood control releases during 1981 and 1982.)

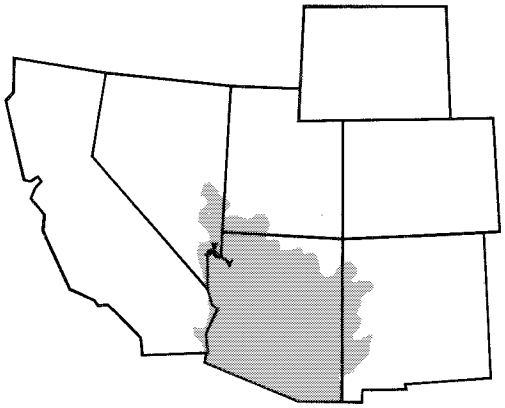
The total release from Lake Mead through Hoover Dam during water year 1981 was an estimated 9,825,000 acre-feet. At the end of the water year, Lake Mead had a water surface elevation of 1,193 feet and an active storage of 21,870,000 acre-feet, which reflect a decrease in storage during the water year of 1,767,000 acre-feet. On September 30, 1981, the active storage of Lake Mead was 1,119,000 acre-feet more than the active storage in Lake Powell.

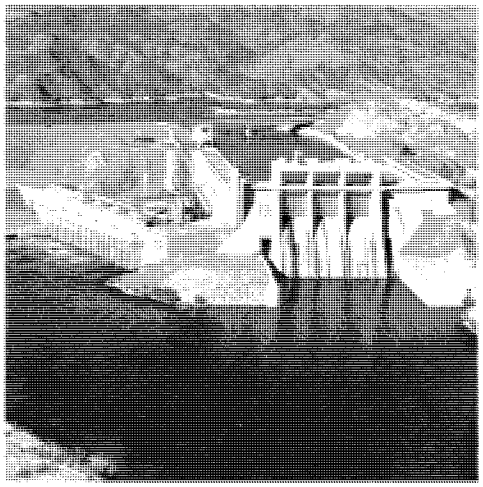
Water Year 1982
During the 1982 water year, the Lake Mead water level is scheduled to rise to elevation 1,204 feet at the end of February 1982, then draw down to a low elevation of 1,194 feet at the end of June 1982. At that level the lake will have an average active storage of about 22.1 million acre-feet. During water year 1982, a total of about 7.5 million acre-feet is scheduled to be released from Lake Mead. All releases are scheduled to pass through the turbines for electric power production.

Lake Mead Active Storage* **Chart 6**

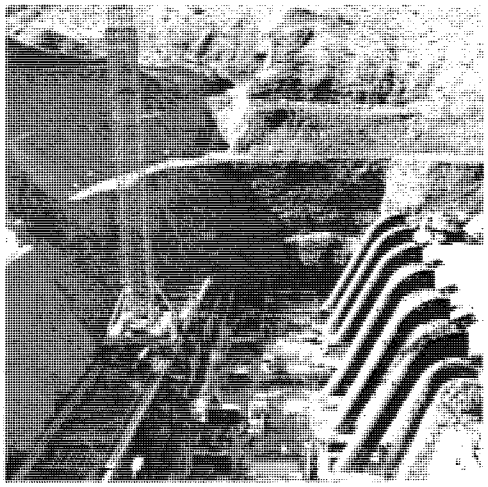
Reservoir	(Acre-Feet)	El. (Ft.)
Maximum Storage	27,377,000	1229
Rated Head	13,653,000	1123
Minimum Power	10,024,000	1083
Surface Area (Full)	162,700 Acres	
Reservoir Length (Full)	115 Miles	
Power Plant		
Number of Units	17	
Total Capacity	1,344,800 Kilowatts	

*does not include 2,378,000 acre-feet of dead storage below 895 feet





Rugged terrain forms backdrop overlooking Davis Dam.

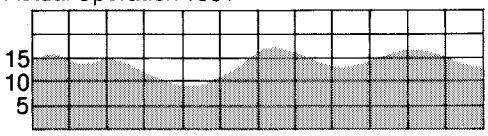


Trestle crane, left, in operation at Havasu Plant.

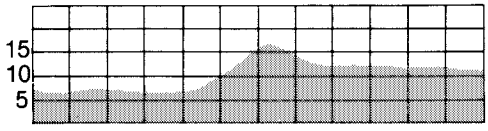
Twenty-one millionth visitor at Hoover Dam.

Outflow Release in 1000 Cubic Feet/Second

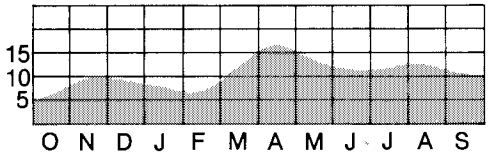
Actual Operation 1981



Projected Operation 1982
Upper Quartile



Average, Lower Quartile,
Most Adverse

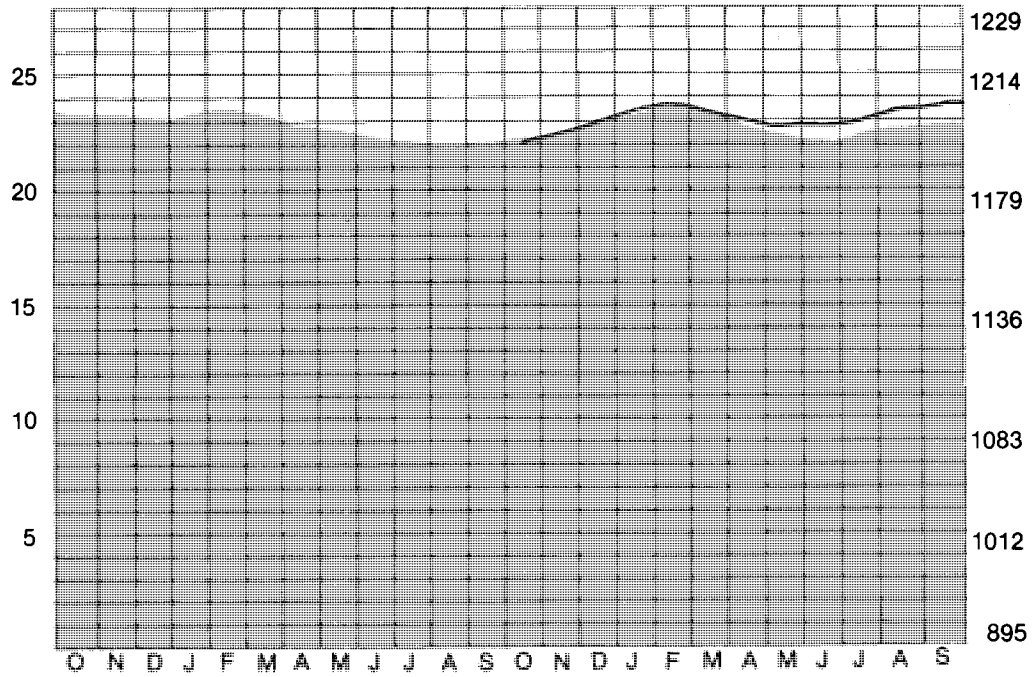


O N D J F M A M J J A S

Storage

Active Content in Million Acre-Feet

Elevation in Feet (Non-Linear Scale)



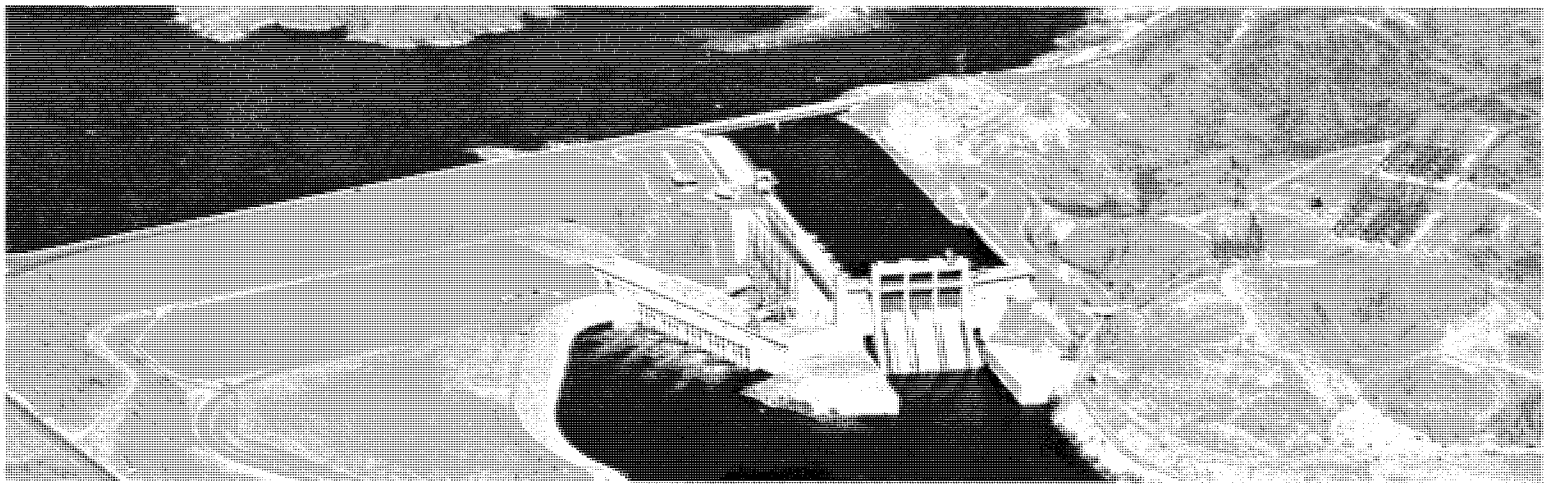
Actual 1981 Projected 1982

Legend

Most Probable

Upper Quartile

Lake Mohave (Colorado River)



Aerial view of Davis Dam and Lake Mohave.

Water Year 1981
At the beginning of water year 1981, the water surface elevation of Lake Mohave, which is impounded by Davis Dam, was 633 feet, with an active storage of 1,445,000 acre-feet.

During the winter months, the water level was raised to 646 feet, with an active storage of 1,768,000 acre-feet at the end of May 1981. The water level was drawn down during the summer to its lowest elevation of the year, 633 feet by the end of August. The reservoir ended the water year at elevation 634 feet with 1,464,000 acre-feet in active storage.

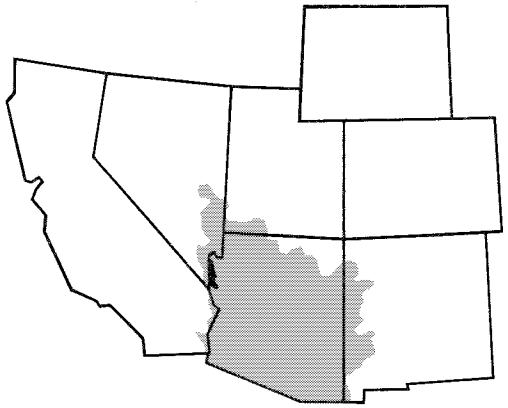
Lake Mohave releases were made to satisfy downstream requirements, with a small amount of re-regulation at Lake Havasu. The additional releases from Hoover Dam were also routed through Lake Mohave. During the water year approximately 10,174,000 acre-feet were released at Davis Dam, all of which passed through the turbines for power production.

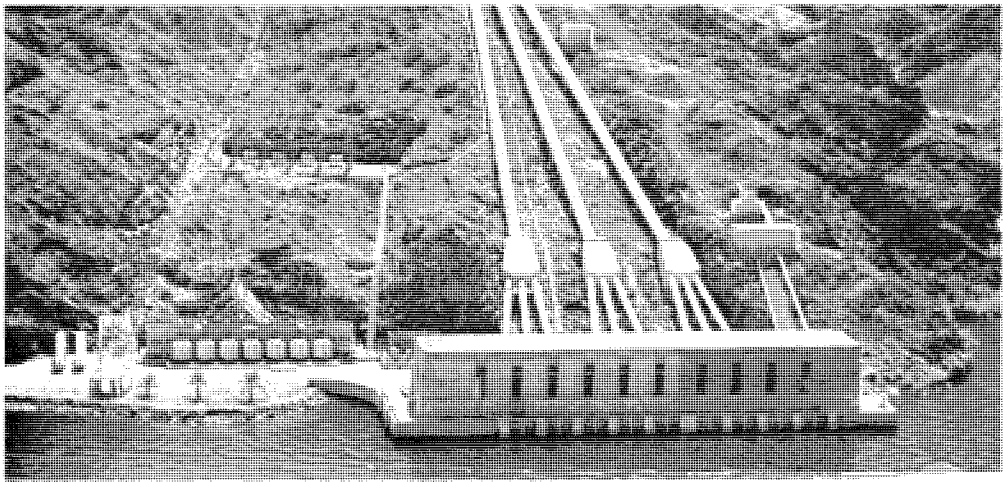
Water Year 1982
The water level of Lake Mohave is scheduled to rise through the fall and winter months and reach elevation 645 feet by the end of May 1982. Because of heavy irrigation use during the summer months, the water level in Lake Mohave is expected to be drawn down to an elevation of 630 feet by the end of water year 1982. During that time a total of 7.7 million acre-feet is scheduled to be released from Lake Mohave to meet all downstream requirements. All releases are scheduled to pass through the turbines for electric power production.

Lake Mohave Active Storage* **Chart 7**

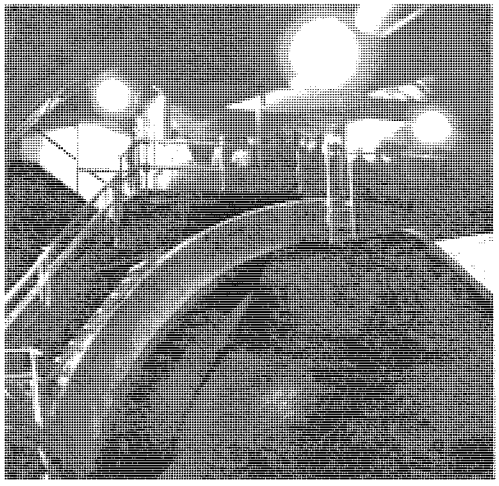
Reservoir	(Acre-Feet)	El. (Ft.)
Maximum Storage	1,810,000	647.0
Rated Head	1,188,000	623.0
Minimum Power	217,500	570.0
Surface Area (Full)	28,200 Acres	
Reservoir Length (Full)	67 Miles	
Power Plant		
Number of Units	5	
Total Capacity	240,000 Kilowatts	

*does not include 8,530 acre-feet of dead storage below 533.39 feet





Whitsett Intake Pumping Plant 2 miles upstream from Parker Dam.

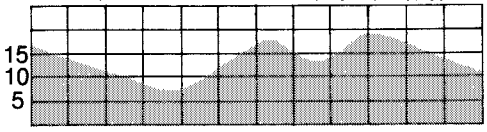


Tourists view diversion tunnel in Arizona wing of Hoover Dam

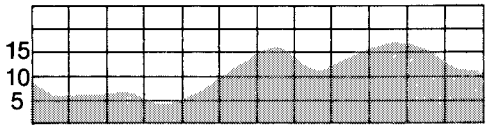
Lake Mohave Outflow

Actual Operation 1981

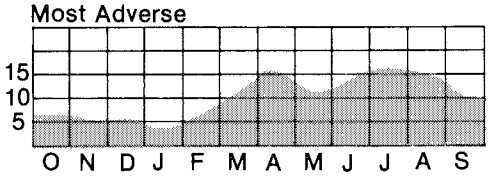
Release in 1000 Cubic Feet/Second



Projected Operation 1982
Upper Quartile



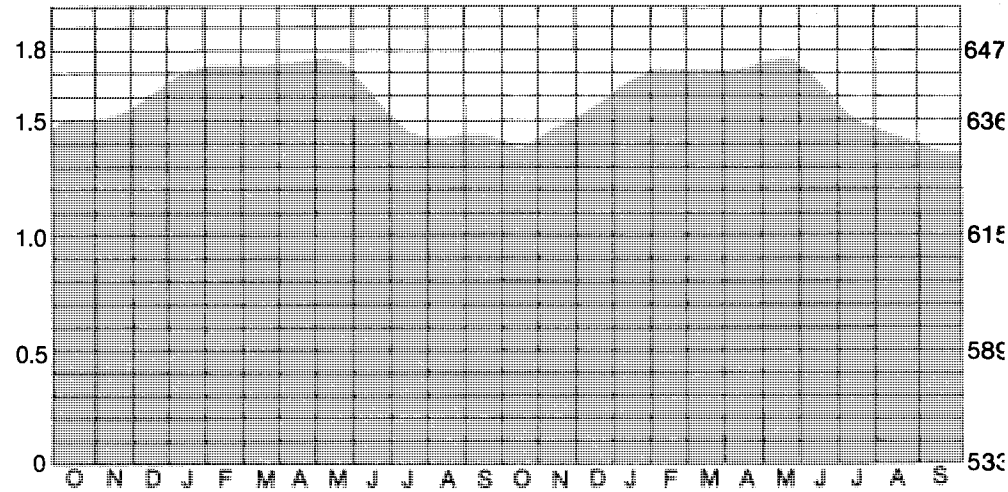
Average, Lower Quartile,
Most Adverse



Lake Mohave Storage

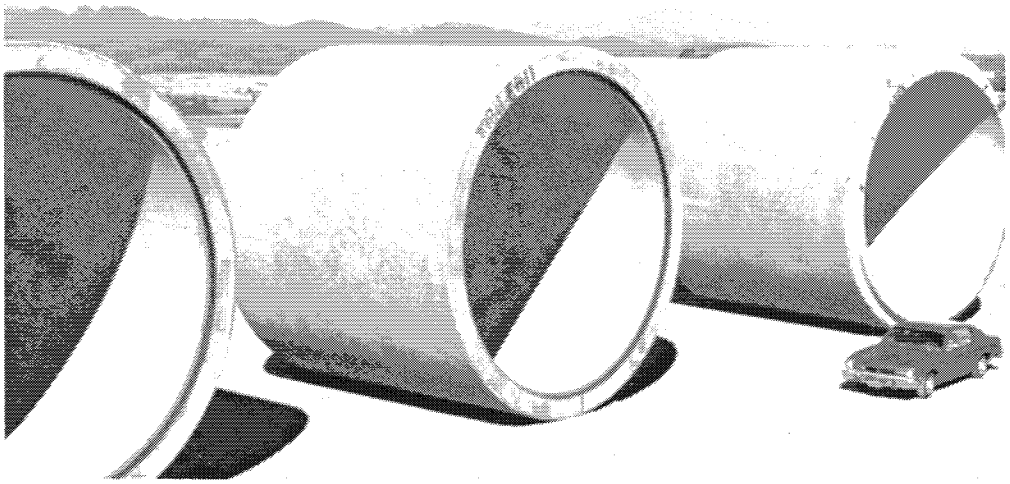
Usable Content in Million Acre-Feet

Elevation in Feet (Non-Linear Scale



Actual 1981 Projected 1982

Lake Havasu (Colorado River)



Giant pipe sections for Central Arizona Project dwarf car.

Lettuce being loaded for Eastern markets.

Water Year 1981
At the beginning of water year 1981, the water level of Lake Havasu, impounded by Parker Dam, was at elevation 447 feet with an active storage of about 554,000 acre-feet. The reservoir was drawn down to approximately elevation 446 feet, with an active storage of about 549,000 acre-feet in February to provide flood control space for runoff from the drainage area between Davis and Parker Dams. The water level was then raised to an approximate elevation of 450 feet by the end of June, with an active storage of about 612,000 acre-feet. By the end of the water year, Lake Havasu was drawn down to about 447 feet with an active storage of 569,000 acre-feet.

During the water year, approximately 8,653,000 acre-feet were released at Parker Dam, all of which passed through the turbines for power production. That amount included the additional releases from Lake Mead during the year and flood control releases from Alamo Dam on the Bill Williams River.

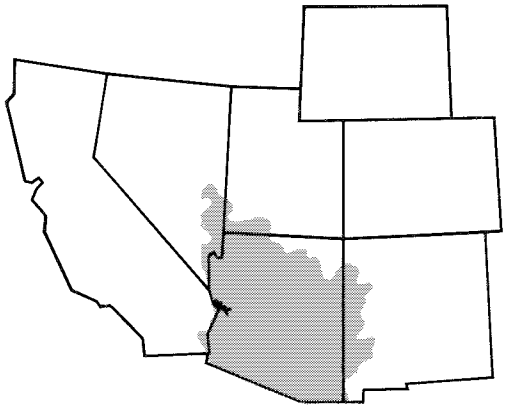
Space in the top 10 feet of Lake Havasu (about 180,000 acre-feet) is reserved by the United States for control of floods and other uses, including river regulation. Normally, only about the top 4 feet, or 77,000 acre-feet of space, have been used for this purpose since Alamo Reservoir on the Bill Williams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

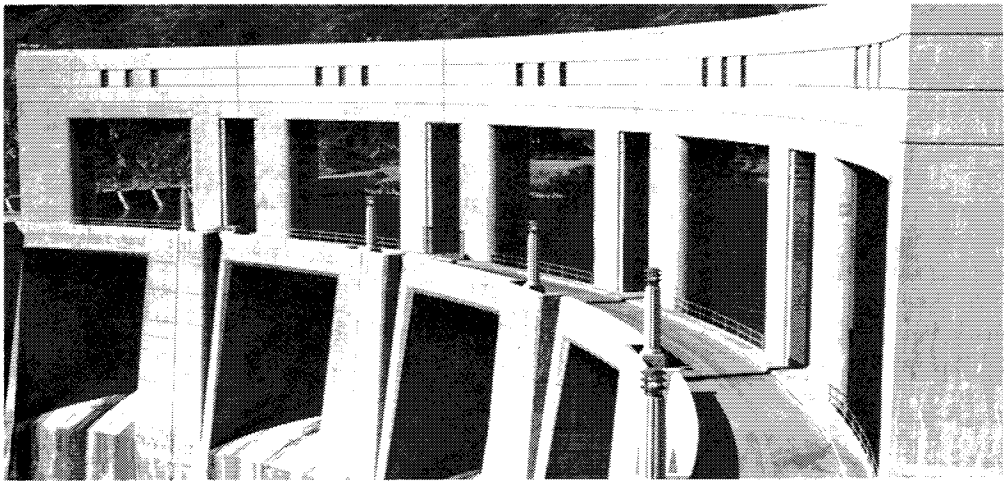
Water Year 1982
Lake Havasu is scheduled at the highest levels consistent with the requirements for maintaining flood control space. The yearly low elevation of approximately 446 feet is scheduled for the October through February high flood hazard period. The yearly high of 450 feet is scheduled for the low flood hazard months of May and June. During water year 1982, a total of approximately 6.6 million acre-feet is scheduled to be released from Lake Havasu to meet all downstream requirements. All releases are scheduled to pass through the turbines for electric power production.

Lake Havasu Active Storage* **Chart 8**

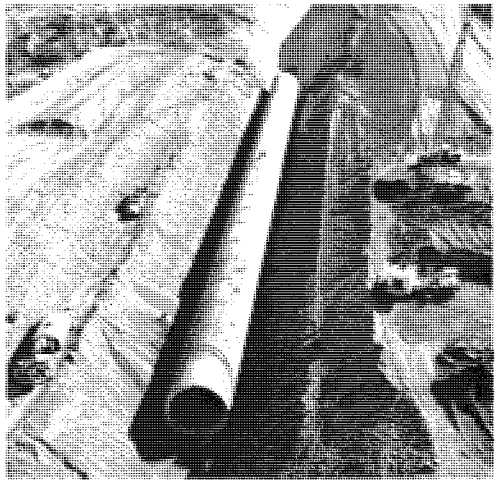
Reservoir	(Acre-Feet)	El.(Ft.)
Maximum Storage	619,400	450.0
Rated Head	619,400	450.0
Minimum Power	439,400	440.0
Surface Area (Full)	20,400 Acres	
Reservoir Length (Full)	35 Miles	
Power Plant		
Number of Units	4	
Total Capacity	120,000 Kilowatts	

*does not include 28,600 acre-feet of dead storage below 400.0 feet





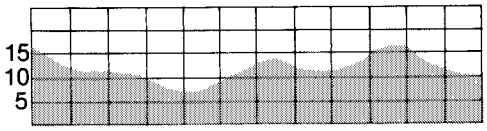
Graceful Parker Dam.



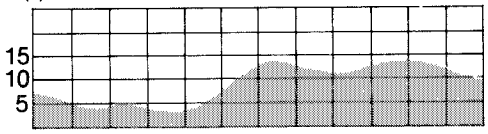
CAP water to flow through this pipe from Havasu.

Outflow Release in 1000 Cubic Feet/Second

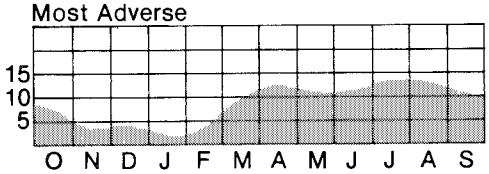
Actual Operation 1981



Projected Operation 1982
Upper Quartile



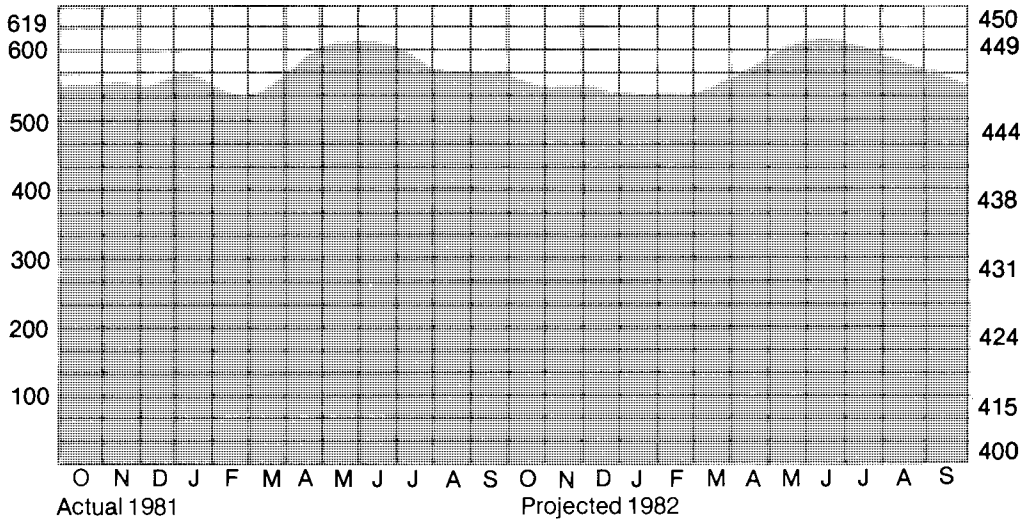
Average, Lower Quartile,
Most Adverse



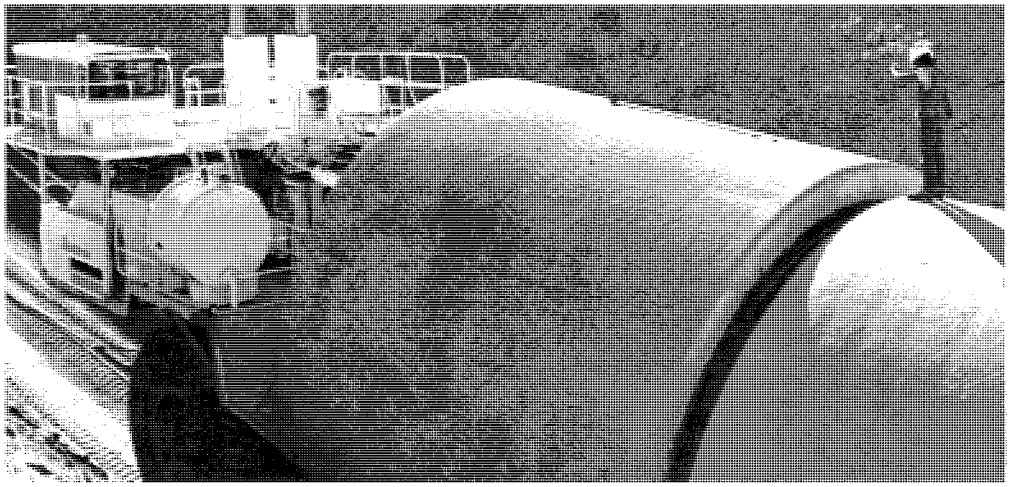
Storage

Usable Content in 1000 Acre-Feet

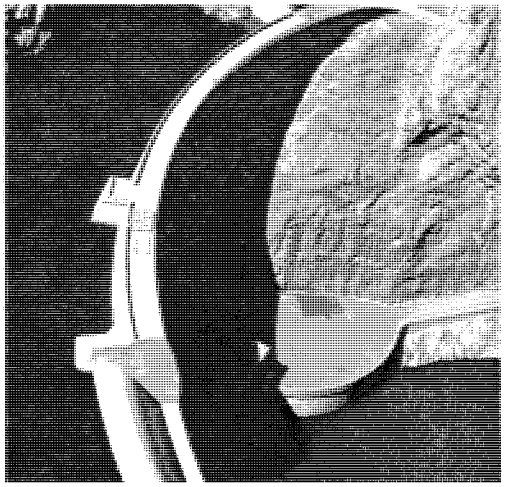
Elevation in Feet (Non-Linear Scale)



River Regulation



Pipemobile guided in placement of CAP pipe.



Helicopter view of Crystal Dam.

The natural virgin runoff reaching the streams of the Colorado River drainage system above Glen Canyon Dam during water year 1981 was estimated at about 8.2 million acre-feet. Of this amount, about 3.8 million acre-feet were consumptively used within the Upper Colorado River Basin States.

Adjustments in storage in mainstem reservoirs resulted in an inflow to Lake Powell of 6.3 million acre-feet. The release from Glen Canyon Dam, based on measurements at the gaging station at Lees Ferry, Ariz., was 8,295,000 acre-feet. For the 1-year and 10-year periods ending September 30, 1981, 8,310,000 acre-feet and 89,692,000 acre-feet, respectively, passed the compact point at Lee Ferry.

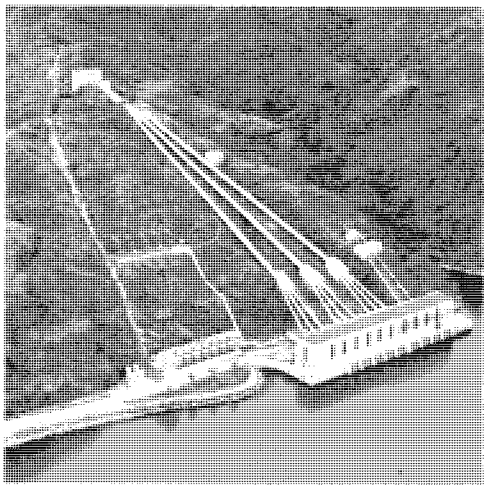
The projected release from Lake Powell based on average, or less, runoff conditions is 8,230,000 acre-feet.The projected release for an upper quartile runoff condition is 9,300,000 acre-feet. When added to the flow of the Paria River, this would result in an Upper Basin delivery ranging from 88.6 to 89.7 million acre-feet for the 10-year period ending September 30, 1982.

Normally, daily releases are made from the storage reservoirs in the Lower Basin to meet the incoming orders of the water user agencies. All water passes through the powerplant units. The daily releases are regulated on an hourly basis to meet as nearly as possible the power loads of the electric power customers. Minimum daily flow objectives are provided in the river to maintain fishery habitat.

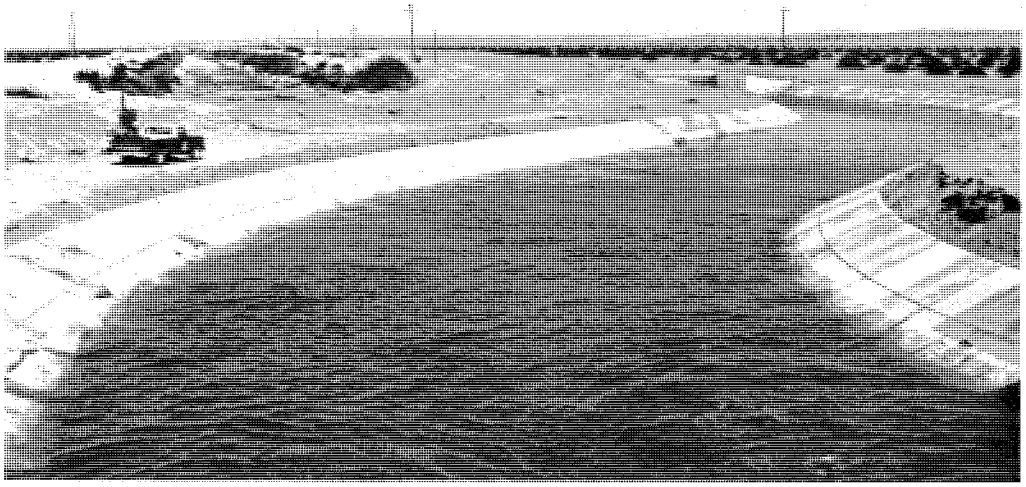
Adjustments to the normal releases are made when conditions permit to provide more satisfactory conditions for water-oriented recreation activities, to provide transport for riverborne sediment to desilting facilities, and to assist in controlling water quality. Releases from Lake Powell were at least 1,000 ft^3/s during the winter months and were increased to at least 3,000 ft^3/s during the summer months. Minimum daytime releases during the summer months averaged 8,000 ft^3/s.

Anticipatory releases and river regulation below Hoover Dam resulted in a total delivery to Mexico of approximately 2,166,000 acre-feet in excess of the treaty quantity (1,700,000 acre-feet) during water year 1981. Of that amount 131,000 acre-feet of drainage waters were by-passed for salinity control pursuant to provisions of Minute No. 242 of the International Boundary and Water Commission.

Flood Control



Beginning of 242-mile Colorado River Aqueduct.



Coachella Canal helps turn desert areas into fertile California land.

Lake Mead is the only reservoir on the Colorado River in which a specified space is exclusively allocated for mainstem flood control. Flood control regulations for Hoover Dam are being updated and revised by the Bureau of Reclamation and the Army Corps of Engineers with the consultation and advice of State and local interests.

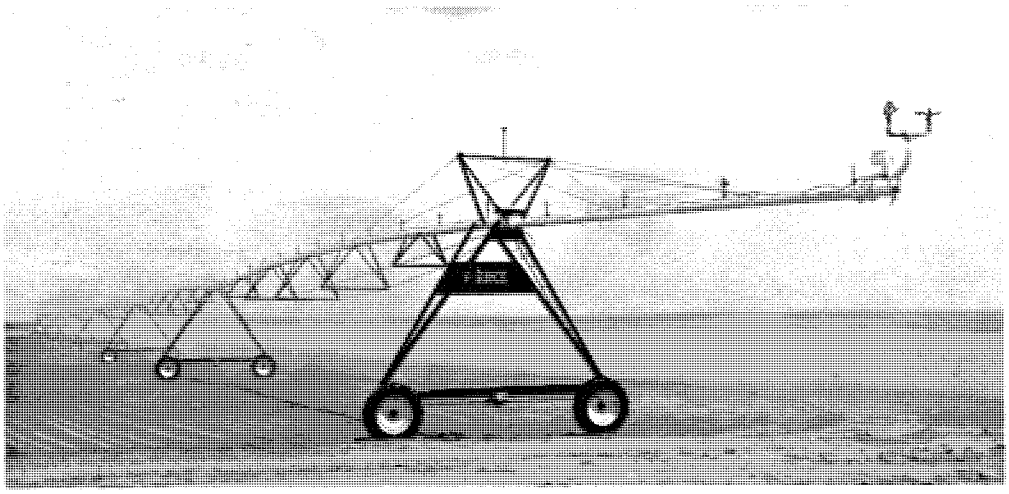
A draft report has been prepared and is in the review process. After the review process has been completed, a final report and revised regulations will be published. An interim agreement on flood control regulations prior to publication of the revised regulations is now in effect. It takes into account the available effective space in Colorado River Storage Project (CRSP) reservoirs as well as in Lake Mead.

Local flood control protection was provided by the reservoirs within the basin during water year 1981, which received lower total precipitation than during normal years. Total Colorado River reservoir system storage at the start of water year 1981 was approximately 54.5 million acre-feet and about 49.6 million acre-feet at the end of the water year, representing a 4.9 million acre-feet increase 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 the winter months. Painted Rock and Alamo Reservoirs are scheduled to be operated at minimum flood control levels during 1982.

Flood control storage space will be maintained in Lake Mead as stipulated in the new interim agreement between the Bureau of Reclamation and the Army Corps of Engineers.

Beneficial Consumptive Uses



Center pivot sprinkler irrigation system.

Blythe, Calif., packing shed, Palo Verde Project.

Upper Basin Uses and Losses

The three largest sources of consumptive use in the Upper Colorado Basin are agricultural use within the drainage basin, diversion to adjacent drainage systems, and evaporation losses. During water year 1981, the estimated use for agricultural and municipal and industrial supply in the Upper Basin was 2,441,000 acre-feet. Estimated evaporation losses were 686,000 acre-feet from mainstem reservoirs. Approximately 713,000 acre-feet were diverted for use in adjacent drainage basins. Thus, total estimated consumptive use amounted to 3,840,000 acre-feet. Storage in the Upper Basin mainstem reservoirs decreased by approximately 3.2 million acre-feet during water year 1981.

Lower Basin Uses and Losses

During water year 1981, an estimated 8,653,000 acre-feet 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, Ariz., the Palo Verde Irrigation District near Blythe, Calif., other miscellaneous users along the river; and the anticipatory releases and transit losses between Parker Dam and Imperial Dam.

The major water diversion above Parker Dam was by The Metropolitan Water District (MWD) of Southern California. The MWD pumped approximately 883,000 acre-feet from Lake Havasu during water year 1981. In contrast with previous years, none of this water was utilized for delivery to the City of Tijuana, pursuant to a contract for temporary emergency delivery of a portion of Mexico's treaty entitlement. During water year 1981, releases of approximately 10,174,000 acre-feet were made from Lake Mohave to provide for releases at Parker Dam; to supply diversion requirements of The 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 1981, releases of approximately 9,825,000 acre-feet were made from Lake Mead at Hoover Dam to regulate the levels of Lake Mohave and to provide for the small users and the losses from this reservoir. In addition, 139,000 acre-feet were diverted from Lake Mead for use by Lake Mead National Recreation Area, Boulder City, Basic Management, Inc., and contractors of the Division of Colorado River Resources, in Nevada. During water year 1981, the total releases and diversions from Lake Mead were an estimated 9,964,000 acre-feet. This amount included the anticipatory releases discussed elsewhere in this report.

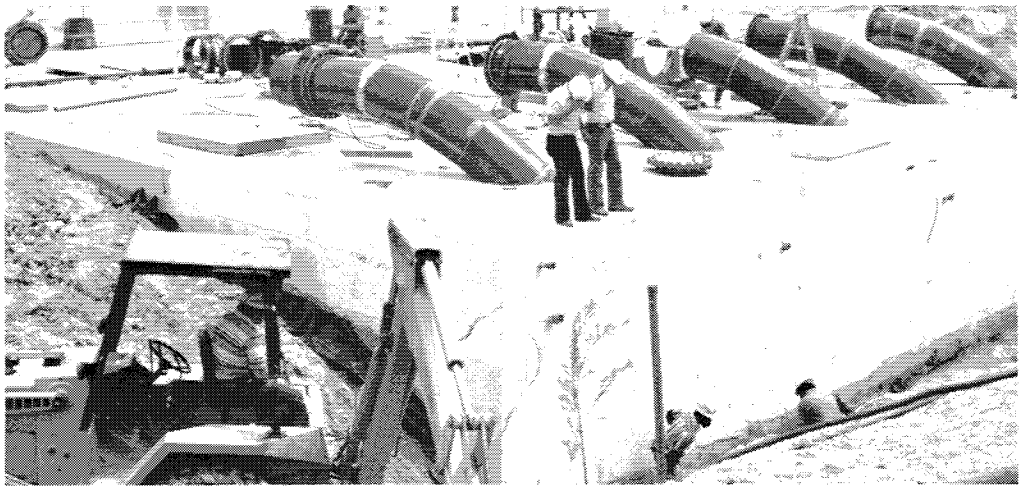
For water year 1982, a release of 6.6 million acre-feet from Lake Havasu has been projected, including consumptive use requirements in the United States below Parker Dam, transit losses in the river between Parker Dam and the Mexican Border, and treaty deliveries to Mexico.

During water year 1982, The MWD is expected to divert 1,000,000 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 162,000 acre-feet.

There are no major users between Hoover Dam and Davis Dam. During water year 1982, consumptive uses by small users, river losses or gains, and reservoir losses between Hoover Dam and Davis Dam are projected to be a net gain of 177,000 acre-feet. The net diversions from Lake Mead are projected at 112,000 acre-feet. Evaporation from Lake Mead is expected to be about 929,000 acre-feet and net gain between Glen Canyon Dam and Lake Mead is expected to be about 884,000 acre-feet.

Water Quality Operations

Hydrilla weed is troublesome in canals.



Backfill placement at Yuma, Ariz., Desalting Plant.

Since water quality aspects of Colorado River operations are extensively described in the biennial series of reports entitled *Quality of Water, Colorado River Basin,* only minimal discussion of this aspect of operation is presented in this report. Report No. 10 of the biennial series was issued in January 1981.

During water year 1981, the United States by-passed a total of 131,000 acre-feet through the By-pass Drain. This water was replaced with a like amount of other water, pursuant to Minute No. 242 of the International Boundary and Water Commission.

Under the provisions of Minute No. 242, the Republic of Mexico is entitled to receive at Morelos Dam water of a quality no worse than 115 parts per million (p/m) (± 30 p/m) greater than that arriving at Imperial Dam. During water year 1981, the average salinity of the Colorado River at Imperial Dam was 786 p/m. During that period the average salinity of the waters at Morelos Dam was 872 p/m, resulting in a salinity differential of 86p/m, well within the provision of Minute No. 242.

No large amount of Gila River infiltration to the Wellton-Mohawk Irrigation and Drainage District is expected during water year 1982 because no flood control releases from Painted Rock Reservoir are anticipated. The total flows in the By-pass Drain during water year 1982 are estimated to be less than 180,000 acre-feet. No by-pass waters are expected to be returned to the Colorado River below Morelos Dam during water year 1982.

In recognizing the need to manage water quality of the Colorado River, it has been recommended that long term salinity increases in the river be controlled through a water quality improvement program generally described in the report, *Colorado River Water Quality Improvement Program,* dated February 1972, and a status report of the same title, dated January 1974.

The program calls for a basin-wide approach to salinity control while the Upper Basin continues to develop its compact-apportioned waters. The initial step towards improvement of the quality of the river's water was authorization by the Congress of the Colorado River Basin Salinity Control Project (Public Law 93-320), on June 24, 1974.

Enhancement of Fish and Wildlife

Spraying to control hydrilla in the Westside Main Canal, Imperial Valley.

Upper Basin

In addition to both cold and warm water fishing opportunities made available in Colorado River Storage Projects (CRSP), Reclamation dams have also created some of the finest fishing available in the tailwater reaches below the reservoirs by providing continuous flows which assure suitable fish habitat. Fontenelle, Flaming Gorge, Navajo, and Glen Canyon tailwater fisheries have all been described as blue-ribbon trout streams by the respective state wildlife agencies which manage their use. The Gunnison River below Crystal Dam also holds great promise for future angling opportunities.

The 1981 tailwater trout fishing below Flaming Gorge has been described as the best year ever. Angler use and catch has exceeded even earlier impoundment yields due primarily to the 1978 penstock modification and warming of downstream flows. Overwintering fingerling trout, for example, have grown to a foot or more in length by the following spring season. Such growth may preclude the need for stocking catchable size trout and thus provide excellent fishing without the increased hatchery costs.

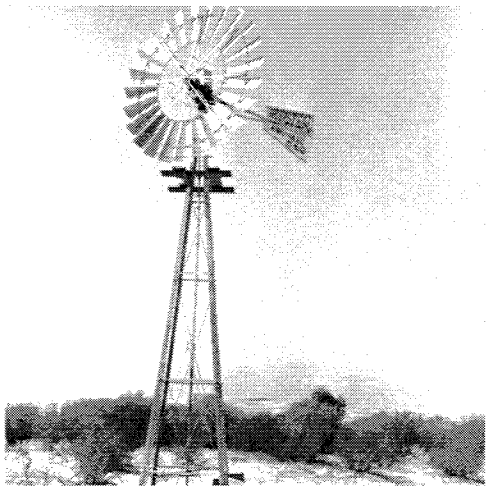
The Navajo tailwater fishery continues to provide excellent fishing. A continuous flow of at least 530 ft^3/s was maintained throughout the year immediately below Navajo Dam for fish propagation. The fishery extends some 17 miles below the dam and contains brown, cutthroat, and rainbow trout. The upper 2.7 miles are regulated under special provision by the New Mexico Department of Game and Fish to insure a quality fishing experience. During the year, representatives from the Bureau of Reclamation, Fish and Wildlife Service, and various New Mexico State agencies met regularly to develop a flow regime which will further enhance the San Juan River fishery, while meeting the other multiple-purpose uses of Navajo Reservoir water.

Recently completed investigations below Fontenelle Dam have led the Wyoming Department of Game and Fish to initiate a program of boulder placement in the Green River below the dam to provide cover and pooling habitat and thereby increase trout production. This program was funded under Section 8 of the Colorado River Storage Act, and will be completed in fiscal year 1982. The overall effectiveness of the program will be evaluated in 1983.

The Glen Canyon tailwater fishery continues to be Arizona's "top fishery" due to the clear water and a continuous flow of at least 1,000 ft^3/s which create a favorable habitat for species of fish introduced in the river below Glen Canyon. The average rainbow trout caught from Lees Ferry during the 1980-1981 fishery season was 18 inches in length and weighed over 3 pounds, or about 6 times the State average. Brook trout have also been added to the stock below the dam where a State record (5 lb. 2 oz.) was caught in April 1981.

Due to limited access to the Gunnison River and a lack of fishery data, the Crystal Dam fishery has not received the attention experienced by other CRSP tailwater fisheries. Preliminary investigations of invertebrate production and fish growth below the dam, however, point toward a bright future. Traveling through the Black Canyon of the Gunnison, the cold downstream releases have extended the trout fishing to Delta, Colo. A continuous flow of at least 200 ft^3/s is maintained in the Gunnison River below the Gunnison Tunnel.

Sampling herbicide mobility in Wisteria Canal.



Windmill pumps water for wildlife.

Trout habitat study at Flaming Gorge.

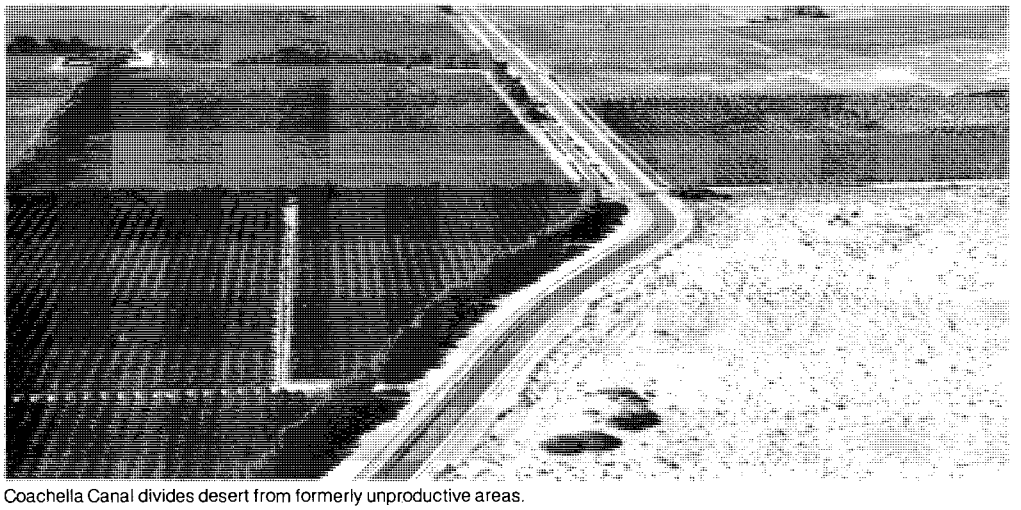
Lower Basin

The fourth year of the 5-year Lake Mead Black Bass Study by Arizona Game and Fish Department (AGFD) and Nevada Department of Wildlife (NDW) was completed during water year 1981. The year's efforts again concentrated on nesting success, survival, cover utilization, and food availability for largemouth bass. Creel census work revealed a trend towards more angler effort for largemouth bass rather than striped bass, as was the case in water year 1980.

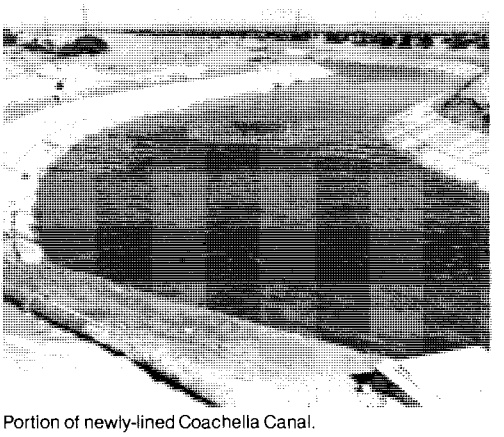
This was also the final year for the evaluation of stocking of different sizes of largemouth bass reared on artificial diets in Lake Mead. The fish are reared in the Fish and Wildlife Developmental Facility in San Marcus, Tex. Five-inch and eight-inch largemouth were marked with fluorescent dye and reward tags, respectively, and released into Lake Mead by AGFD and NDW.

The final report and recommendations for all phases of this study will be completed December 31, 1982. The study has been funded by the Upper and Lower Colorado Regions of the Bureau of Reclamation.

Preservation of Environment



Coachella Canal divides desert from formerly unproductive areas.

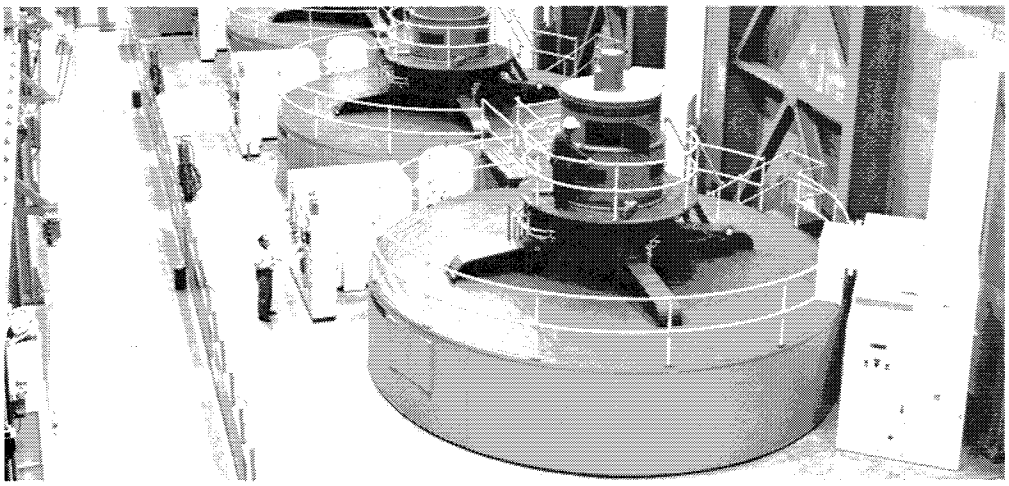


Portion of newly-lined Coachella Canal.

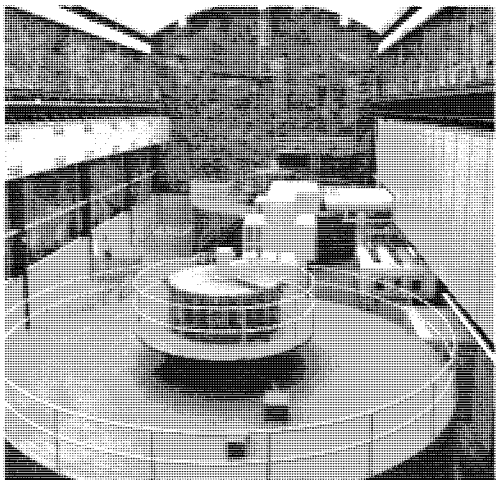
Reclamation is conducting a selective strip clearing project in the Cibola Division of the Lower Colorado River below Palo Verde, Calif. The study area is a 6.5-mile fringe of riparian vegetation inside the flood control levees. Hydraulic and engineering studies indicate that a major flood in this area could spill over the levees. Selective clearing of vegetation could decrease the chance of this happening. The study area includes an estimated 700 acres of vegetation; the proposed study would remove about 180 acres. Vegetation would be cleared in 50-, 75-, and 100-foot linear strips parallel to the Colorado River. If the follow-up study shows significant impacts to wildlife, mitigation will be developed. The project is being planned and coordinated with other State and Federal agencies.

A temporary cooperative program with the California Department of Fish and Game (CDFG) to provide water to wildlife has improved conditions for deer near the Coachella Canal during the summer of water year 1981. The recently-lined canal is an obstacle and source of significant mortality for deer moving from the Chocolate Mountains to water in the canal itself or in seeps to the west. As part of mitigation agreements with the Fish and Wildlife Service and CDFG, windmill watering devices are being constructed in vegetation pockets frequented by the deer on the east flank of the Algodones Dunes. By the summer of 1982, with the windmills in operation, hopes are that the deer will come to these wells for water, eliminating the need for the temporary watering program, as well as significant canal-related deer losses. Other studies of deer are being conducted in the Wellton-Mohawk canal area, and in the riparian zone of the Lower Colorado River.

Power Operations



Powerhouse interior at Flaming Gorge Dam.



View of underground Morrow Point Powerplant.

Upper Basin —
Colorado River Storage Project (CRSP)

The following table summarizes the CRSP generation, purchases, disposition, and revenue from power operations for fiscal year 1981 and presents projections for fiscal year 1982.

The total revenue from power operations in fiscal year 1981 was $74,125,988. For fiscal year 1982, estimated revenues are $77,784,000.

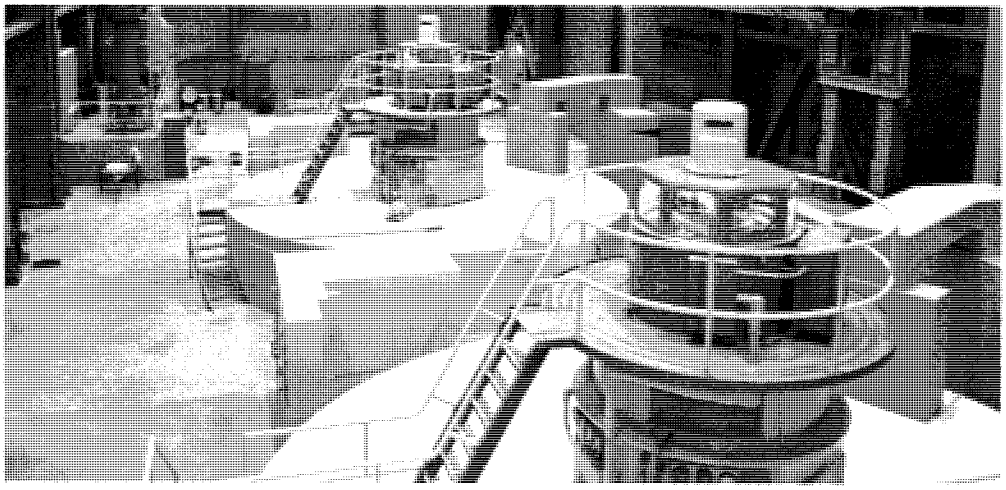
Water Year 1981

Sources of Energy	
Net Generation	**kWh**
Flaming Gorge	360,789,000
Blue Mesa	245,511,900
Morrow Point	314,808,000
Fontenelle	57,642,000
Glen Canyon	3,877,310,000
Crystal	169,604,400
Subtotal — Net Generation	5,025,665,300
Purchases (for)	
Parker Davis Firming	0
Rio Grande Firming	0
CRSP Firming	848,141,112
Fuel Replacement	842,511,888
Subtotal Purchases	1,690,653,000
Transmission for others	222,038,000
Power Deliveries from others (Interchange)	998,225,664
Total Energy Receipts	7,936,581,964
Disposition of Energy	
Firm Energy Sales	5,625,040,712
Non-Firm Energy Sales	842,511,888
Power Delivered to others (Interchange)	987,614,910
System Losses	841,414,451
	7,936,581,964

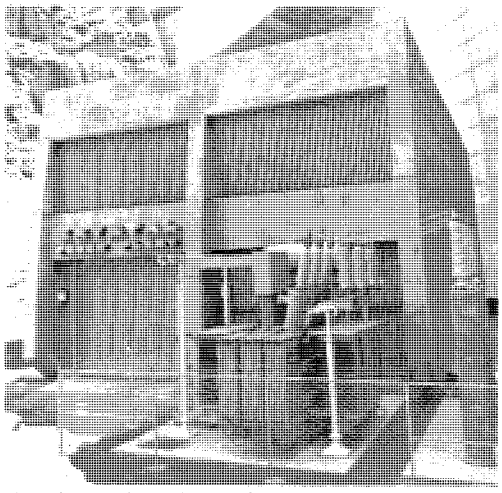
Revenue	
Firm Energy Sales	$46,627,358.00
Nonfirm Energy Sales (Oil Conservation)	22,186,552.79
Parker Davis Firming	0
Wheeling for others	2,584,144.27
Miscellaneous Income	2,727,932.97
Total Revenue	$74,125,988.03

Water Year 1982

	kWh
Estimated Energy Sales	6,878,668,000 kWh
Estimated Purchases	2,000,000,000 kWh
Estimated Peaking Capacity Sales (kW)	
Winter 80-81	243,085 kW
Summer — 81	82,154 kW
Estimated Revenue	$77,784,000

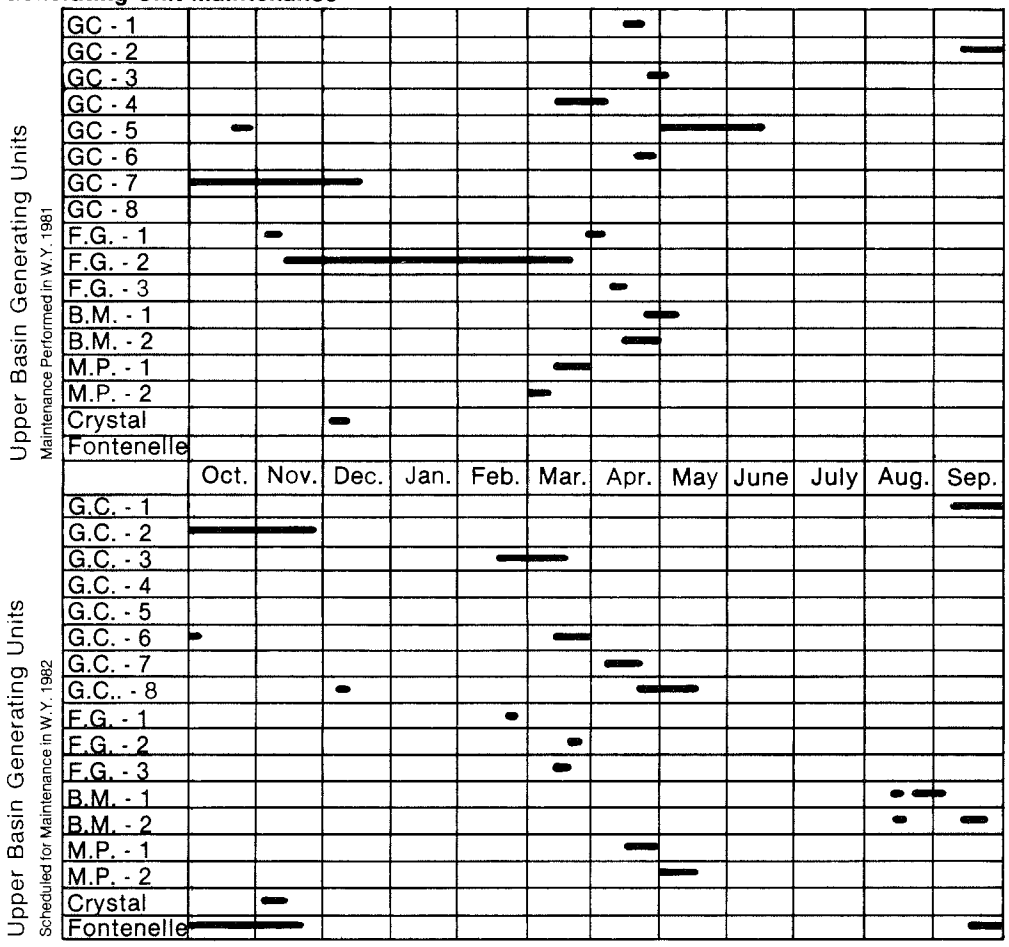


Inside of Blue Mesa Powerplant.



View of powerplant at base of Crystal Dam.

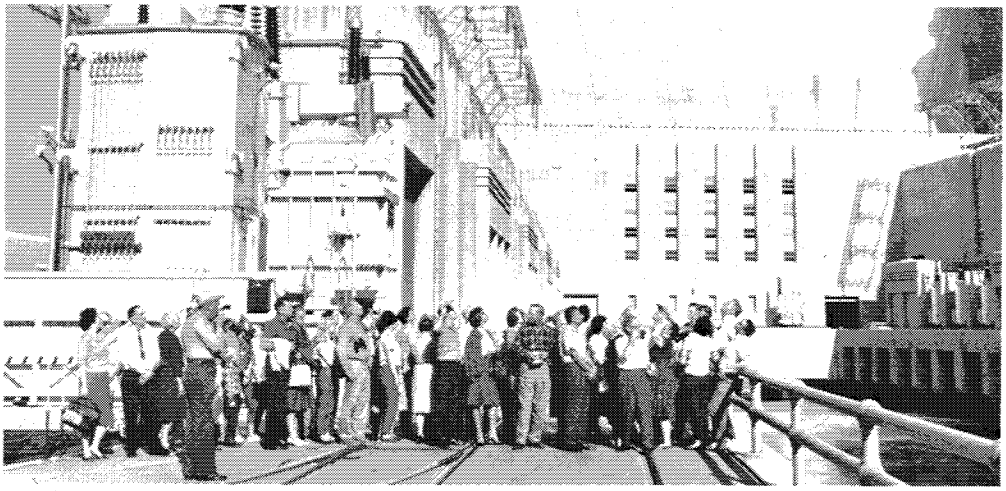
Generating Unit Maintenance



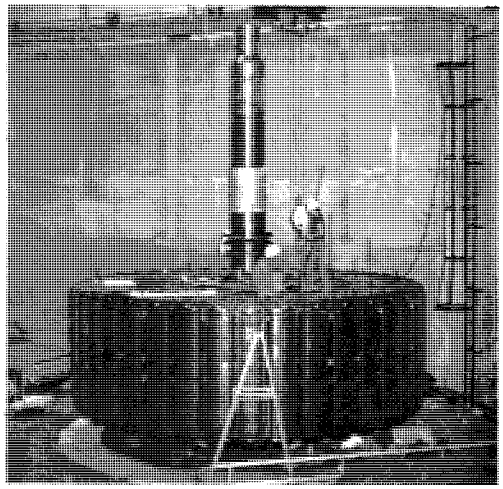
Lower Basin —
Water Year 1981

As discussed in the section on additional releases, on June 19, 1980, the Secretary of the Interior, consistent with his previous approval, declared that extra water would be released from Hoover Dam sufficient to generate contract-defined firm energy during the year of operation ending May 31, 1981.

The Hoover Powerplant followed this schedule with necessary monthly modification to allow for prudent excess releases from Hoover Dam along with mandated flood control releases by the Corps of Engineers from Alamo and Painted Rock Dams to meet downstream requirements, while minimizing damage to the interests in the United States and in the Republic of Mexico. The releases from Painted Rock Dam continued until November 1980, and releases from Alamo Dam were made from July until mid-October. Beginning in November, however, precipitation at the 13 selected basin stations dropped below normal and continued to decline. In view of the January forecast of below normal April-July runoff and projected reservoir conditions, Hoover releases were reduced to meet downstream requirements only.



More than 600,000 tour Hoover Dam and Powerplant each year.



Replacement rotor at Hoover Powerplant.

The total energy delivery to the Hoover allottees during the 1981 operating year (June 1, 1980-May 31, 1981) was 4,931,167,357 kilowatt-hours (kWh). Of this total delivery, firm energy amounted to 3,953,320,000 kWh, and the balance was disputed energy, 113,038,527 kWh, and secondary, 864,808,830 kWh.

All scheduled periodic maintenance at Hoover, Parker, and Davis Powerplants was performed in water year 1981. During the year, the Arizona Number Seven (A7) generating unit's turbine runner was replaced with a new stainless steel runner which will reduce maintenance time and increase efficiency of the turbine. The runner on Unit A4 at Hoover Powerplant was reconditioned and reinstalled. The new stainless steel runner for this unit cannot be satisfactorily used until speed is greater than 200 rpm. Also, the upper Arizona penstock at Hoover Dam was reconditioned during water year 1981.

Water Year 1982

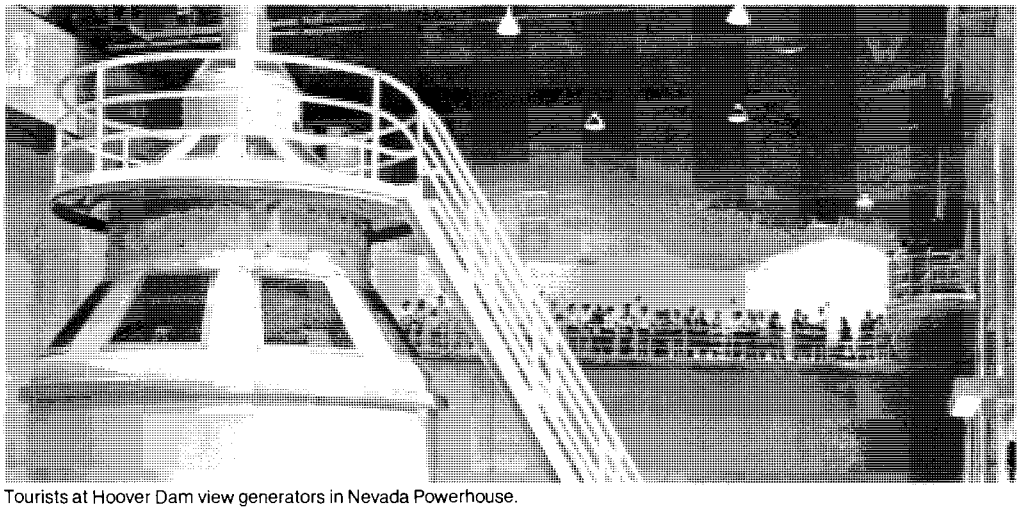
In operation studies of Lake Mead and Lake Powell for the Hoover operating year, which ends May 31, 1982, the amounts released at Hoover Dam have been projected to satisfy only minimum downstream water requirements, including diversions by The Metropolitan Water District, while complying with the overall requirements to meet compact and operating criteria release provisions. The water scheduled to be released will generate about 90.1 percent of defined firm energy. The estimated monthly Hoover releases during the operating year total 7.8 million acre-feet. 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 3.6 billion kWh of electrical energy. Deficiency power purchases have not been budgeted for operating year 1982.

The upper Nevada penstock is scheduled for reconditioning during water year 1982. A replacement of the intake structure's cylinder gate seals also is scheduled at the same time. The seals have been redesigned and include bonded rubber on the sealing surface instead of a bronze surface. The purpose of this redesign is to provide a better fitting seal so that the invert section of the penstock can be maintained in a more satisfactory manner.

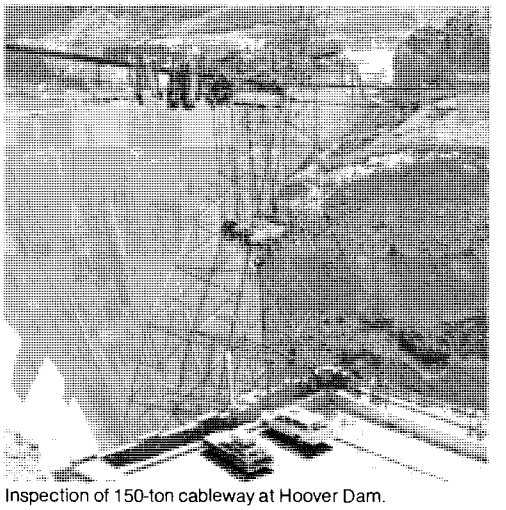
The contractor started uprating generating unit A5 during water year 1981. This undertaking will involve rewinding the stator coils, reinsulating the rotor coils, and installing a solid state voltage regulator for the main excitor. At the same time this work is being accomplished, the Government is rebuilding all of the control circuits to replace obsolete equipment. This will enable the operators to start and stop the unit from the control room.

The installation of control wiring and related equipment needed to complete the automation of the generating units at both the Davis and Parker Powerplants has been accomplished. Refinement of the necessary software (computer programming and operational and administrative areas of responsibility) is being completed, with the remote control operation of both powerplants scheduled to occur during water year 1982. When the automation is fully effected, the existing powerplant control rooms will be unmanned and the present operators assigned to other duties in the powerplants. The Davis and Parker generator units will be operated from the Department of Energy's Phoenix Dispatch Office, working in conjunction with Reclamation's Water Scheduling Branch in Boulder City, Nev.

The following charts illustrate Lower Basin generator unit outage schedules for water year 1981 and water year 1982.

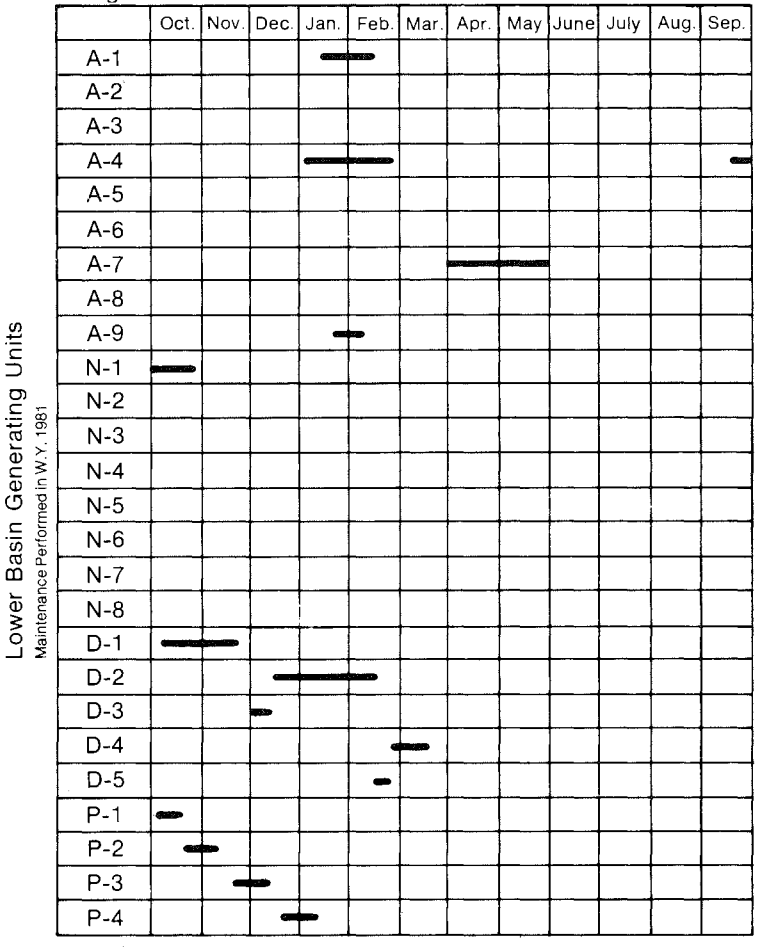


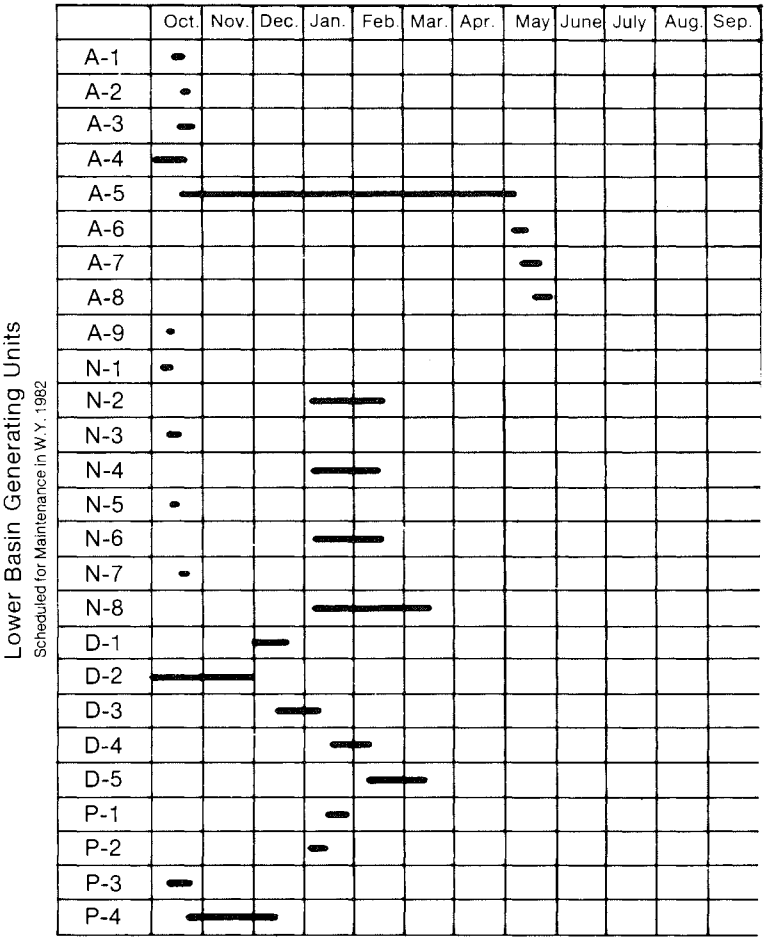
Tourists at Hoover Dam view generators in Nevada Powerhouse.



Inspection of 150-ton cableway at Hoover Dam.

Generating Unit Maintenance





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